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CAMP DISEASES.

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OUTLINES

OF THE

CHIEF CAMP DISEASES

OF THE

UNITED STATES ARMIES

AS OBSERVED DURING THE PRESENT WAR.

Robt Watts Jr.

A Practical Contribution to Military Medicine.

BY

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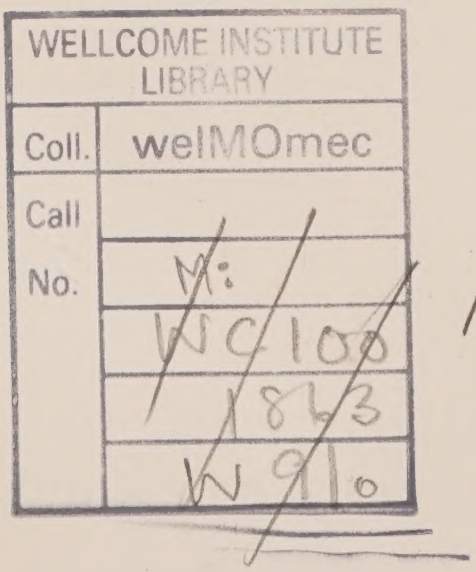

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TO

BRIGADIER-GENERAL WILLIAM A. HAMMOND,

SURGEON-GENERAL UNITED STATES ARMY,

ALIKE DISTINGUISHED FOR THE ABILITY WITH WHICH HE HAS CULTIVATED

PHYSIOLOGICAL RESEARCH AND SANITARY SCIENCE,

AND FOR THE

ENLIGHTENED AND LIBERAL POLICY

WHICH HAS CHARACTERIZED HIS ADMINISTRATION OF THE LARGEST

AND MOST SUDDENLY CREATED MEDICAL DEPARTMENT

THE WORLD HAS EVER SEEN,

This Volume

IS RESPECTFULLY DEDICATED BY

THE AUTHOR.

PREFACE.

THE importance of the affections referred to in the following pages, the vast numbers of human lives exposed to them, and the fact that in this country, now making war on a great scale for the first time in the present generation, camp diseases are in many respects new to those called upon to treat them, are considerations which in themselves alone might justify this attempt to grapple with the problem of the mortality of armies in America.

If, in addition, it should prove that considerable dissimilarity exists between the chief diseases observed among troops on this continent and those which have decimated the combatants in European wars, so that the descriptions of the authors who have written on camp diseases abroad are far from corresponding with what is here encountered daily, the necessity for an American work on this subject becomes at once apparent.

Engaged for many months in the laborious duty of preparing for the medical department, "*The Medical History of the Rebellion,*" the author has necessarily given much earnest thought to these affections, with which he had already acquired some familiarity by active service in the field during the first year of the war.

The intention of preparing an elaborate treatise on the diseases prevailing among the armies of the United States, was formed at an early date, and with this object in view, the author sought and found continued opportunities of observing these

affections in the great military hospitals of Washington, while his position as Curator of the Medical and Microscopical Departments of the Army Medical Museum has opened to him a large pathological field.

His studies are, however, as yet very incomplete, and did he consult merely his own inclinations he would maintain a discreet silence until accumulated observations had ripened and completed his opinions and enabled him to conclude many imperfect investigations. It has, however, been suggested to him that these unfinished studies may be of use to others. That fragmentary as they are, they may give to some a clew to unravel phenomena which appear to them chaotic; that especially they may be serviceable to those daily entering the service, who have had as yet no experience in camp diseases, and that perhaps even the pathological observations and therapeutical suggestions presented may interest those of his brother officers whose opportunities for comprehending these affections have been fully equal to his own. This hope alone would determine him to publish his studies in their present incomplete form.

The following pages therefore have no pretension to be a complete treatise on camp diseases; an outline is all that is aimed at, a brief sketch which at some future period may be worked up into a more finished picture. The attempt is made merely to present the prominent features of the diseases of the army as they have been observed by the author, who has not generally ventured to go beyond his own experience for his facts. For this reason, as a rule, the numerous European works on similar subjects are not quoted or referred to. Excellent as many of them are, the disorders which they describe are in important respects diverse from those of our own troops, and to have referred to them at all would have necessitated comparisons and criticisms which would have swelled the work far beyond the dimensions to which it was considered desirable to limit it.

The author cannot hope to have escaped entirely from prema-

ture conclusions, mistaken judgments, perhaps even errors of observation; he therefore cordially invites the friendly criticism of his brother officers. He has no wish to dogmatize on subjects which involve the lives of thousands, and none of his opinions are so dear that he will not willingly abandon them forever if they can be shown to be erroneous. With these views he presents his work to the medical public; if it should prove useful to any of the devoted men who are daily combating these diseases in the field and the hospitals, or serve to stimulate others to record observations, better, let it be hoped, than his own, he will have no cause to regret the labor bestowed upon the composition of these pages, amid the engrossing cares and incessant occupations of a great and responsible undertaking.

The statistical figures and tables contained in this work are all taken from two official publications of the medical department, both of which were based upon communications from the author to the Surgeon-General. The first of these publications is a "Report on the Sickness and Mortality of the U. S. Army for the year ending June 30th, 1862," which was laid before Congress, by the Surgeon-General, in February, 1863, and at the time published very generally in the medical and secular journals throughout the country. This report gives a statistical table of the total number of cases and deaths for each disease as reported officially for the year in question. It also gives the average annual mean strength represented. The second is Circular No. 15, Surgeon-General's Office, series of 1863, which gives, with other matter, the statistical tables representing the influence of season and region on the disease and mortality of the army for the year ending June 30th, 1862. These two papers became, of course, on their publication, the common property of the medical men of the world, and the author has, therefore, not hesitated to draw upon them freely. He has, however, scrupulously avoided making public any of the statistical figures contained in the unpublished records of the Surgeon-General's Office

now in the course of preparation for the Medical History of the War. However interesting it would have been to his readers to present minuter details and statistics referring to more recent times, he could not, consistently with his own sense of propriety, make use of his position to obtain for himself any data not otherwise accessible, even did not his official duties render such a course impossible.

The appearance of the volume, which was commenced some time since, has been somewhat delayed by the fact that the author's official duties occupying him throughout the entire day, he has only been able to devote his evenings to the preparation of the work.

J. J. WOODWARD,
ASSISTANT SURGEON U. S. ARMY.

WASHINGTON, Nov. 2, 1863.

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CAMP DISEASES.

CHAPTER I.

INTRODUCTORY.

At an early period in the history of the present war, a tendency on the part of all the diseases of the troops to assume an adynamic character was observed both by the military surgeons, upon whom their treatment devolved, and by medical men from all parts of the country, brought in contact with the encampments or hospitals of the army. The phenomena presented soon became so serious that in the winter of 1861 it was very generally feared that true typhus, the scourge of the armies of Europe, was about to make its appearance; and at least one major-general in command of a great army appointed a medical commission to examine into the causes of the adynamic character of the diseases of his troops, and to suggest means of prevention.

The exaggerated fears of that period have happily not yet been realized, and the continued fevers of our army are still, up to the present time, far less fatal than the redoubtable camp fevers of Europe.

Nevertheless, the peculiar adynamic tendency of all diseases affecting the troops continues to be a promi-

nent feature, without a complete recognition of which their history cannot be comprehended.

It is shown in the malarial fevers, which have always been a prominent group of diseases in American practice. The ordinary remittent fever under this influence assumes a new character, presenting from its very earliest stages a typhoid tendency, which masks to a great extent its real character, and justifies fully the new designation of Typho-Malarial applied to such cases in this volume.

It is shown in the epidemic measles which has prevailed so extensively among recently-formed regiments, and which has not only presented decidedly adynamic features during the continuance of the exanthematous affection, but has generally left the patient in an exhausted and prostrate condition from which he enjoys at best a tardy convalescence, interrupted by attacks of acute inflammations of a typhoid type, bronchitis, pleuro-pneumonia, and pneumonia.

It is shown in the ordinary bronchial affections which have prevailed, and which have been accompanied by a depression and prostration, and have been followed by a degree of exhaustion not usual in these complaints.

It is shown in the diarrhœas and dysenteries which have constituted more than one fourth of all the diseases of the army, and in the idiopathic phlegmasiæ of every character, as well as in surgical inflammations resulting from wounds and injuries.

The practical result of this wide-spread typhoid tendency has been not merely an increased proportional mortality in all the diseases thus modified, but it has been found that depressing therapeutic agents

of every character, including blood-letting, antimonials, mercurials, and low diet, have been ill borne, and the majority even of the warmest adherents of such remedies have usually, after some experience, grown exceedingly cautious in their administration or abandoned them altogether.

To trace in detail this modifying influence, arising, as we shall hereafter see, not from one cause, but from many, and to describe fully the various diseases altered by its influence, would be a task far larger than would be justified by the facts at present in the possession of the author. It is, therefore, intended to limit the following pages strictly to the consideration of some of the prominent members of the single group of zymotic diseases.

But these affections are unfortunately so widely diffused that they make up the great bulk of the diseases of our armies. From the outbreak of the rebellion to July 1, 1862, up to which period the medical statistics of the war have been computed, the cases reported of the several affections described in this volume are nearly twice as numerous as the cases of all other diseases, that is, the leading zymotic affections here considered have produced two-thirds of the disease occurring among our forces.

Zymotic diseases are wide-spread constitutional affections produced among masses of men by ill-understood causes, which modify profoundly the normal condition of the whole system.

The following brief definition, originating with Dr. Farr, of London, has been adopted by the medical department of the British army, and will be found in the statistical report of the director-general for 1859, page 8:—

"Morbi Zymotici—Zymotic Diseases.

"Diseases which are either epidemic, endemic, or communicable, induced by some specific body, or by the want or by the bad quality of the food."

The word zymotic, derived from the Greek ζυμοω, "to ferment," was first applied to disease, under the idea that certain affections were caused by some morbific principle acting on the blood after the fashion of a ferment.

It is now known, however, that the process of fermentation is characterized by the development of special vegetable cell-forms, which are readily demonstrated, and that nothing similar to this ever occurs in the blood of living beings; that consequently there is no strict propriety in comparing to fermentation any pathological process occurring in the blood. It is, moreover, somewhat doubtful whether these diseases can with propriety be regarded as originating in the blood alone.

The word zymotic, therefore, in the sense in which it was originally intended to be used, is no longer a proper designation of any class of diseases.

Nevertheless, as an adjective, which has come into very extensive use, especially in the last few years, we may retain the designation, as we do that of inflammation, cancer, and many other terms which have outlived their original signification, for convenience sake, and because it would be difficult to win general acceptance for any substitute, and, without general acceptance, a new term only induces confusion and misconception.

The epithet zymotic may therefore be retained to characterize this class of affections in almost precisely

the same sense used in the classification of the Statistical Congress, and employed in the published reports of the British army for 1859 and 1860.

One modification has, however, appeared necessary; in the classification of the Statistical Congress, the class *Zymotic diseases* is divided into four orders—1. Miasmatic diseases. 2. Enthetic diseases. 3. Dietic diseases. 4. Parasitic diseases.

Under the head of parasitic diseases, tape-worm, intestinal worms generally, and scabies, are included with certain diseases in which parasitic fungi have been noticed, as in aphthæ, porrigo, and the like. This is not the place for discussing the disputed question, whether these latter are true parasitic diseases; whether, in a word, the fungi observed are the efficient cause of the affection, or only find, in the peculiar condition of the surface, a favorable nidus for development. Without entering upon this inquiry, and admitting all the diseases of the English classification to be caused by parasites, it is difficult to perceive any sufficient reason for placing these accidental affections in the same group, with the grave constitutional diseases embraced in the zymotic class. It is true that as the acarus scabiei, like the louse, is migratory, and passes from individual to individual, itch appears contagious; but it would be as reasonable on this account to regard the victim of lice as suffering from a zymotic affection as the itch patient. In both there are parasitical animals upon the surface.

All the other zymotic affections are serious constitutional complaints, which present from the pathological stand-point much similarity. The per-

version of nutrition is so marked that, at the present moment, all these affections are regarded as essentially blood diseases by a large number of pathologists, and even those whose views lead them to the utter rejection of the humoral pathology, admit that decided alterations in the circulatory fluid are a leading characteristic sooner or later in these complaints.

It is difficult to perceive the logical propriety of attempting to place in such a category morbid conditions, such as the presence of intestinal parasites and scabies, which, even in a marked degree, may coexist with the most perfect general health. The day has gone by when pathologists can believe that psora (itch) is a constitutional affection at the root of a multitude of diseases.

Influenced by these considerations, the author, while a member of the board appointed in the summer of 1862 to revise the form employed in the United States army for the statistical report of sick and wounded, was mainly instrumental in inducing that body to remove parasitic diseases from the class zymotic, and to erect these complaints, which are not comparable to any other, into a separate class.

In the statistical form at present employed in our armies, therefore, the zymotici do not embrace the order parasitic diseases, which instead stands as a separate class, *Parasitici.*

The class of zymotic diseases, as employed in this work, then, and in the form for the statistical report of the United States army, consists of three orders—

1. Miasmatic diseases. 2. Enthetic diseases. 3. Dietic diseases.

A few explanatory remarks will be offered under each of these heads.

Following the plans proposed by the Statistical Congress, miasmatic diseases will be regarded as embracing all zymotic affections except those propagated by inoculation only (enthetic), and those due to errors of diet.

The word miasmatic is, therefore, used in its original broad sense, to include all diseases due to the influence of miasms, whether those arising from telluric sources, such as vegetable decomposition (koino-miasmata), or those produced by the decomposition of matters derived from the human body (idio-miasmata).

The word miasm, or miasma, then, derived from the Greek word *μιασμα*, a stain, should be broadly employed as the designation of any of the unknown atmospheric influences arising from either of these sources.

In the popular usage of this country, even among the majority of professional men, the terms miasma and miasmatic diseases are used in a much narrower signification, being limited to the first of the two categories above indicated. So that ordinarily, by miasmatic diseases the American practitioner understands intermittent and remittent fevers, and other malarial diseases only.

This limited use of these terms among American physicians is probably due, to a great extent, to the large influence exercised over the professional mind in this country by the author's friend and former preceptor, the venerable Dr. George B. Wood, of Philadelphia, whose name it is impossible to utter without the profoundest respect, and who, both by his lec-

tures, from which many thousands of American medical men derived their first impressions, and by his treatise on the Practice of Medicine, which has been perhaps more extensively read in this country than any other work on the same subject, has exercised the largest influence over the American medical mind. In the work referred to, as well as in his lectures, Dr. Wood limits the use of the term miasmatic diseases exclusively to affections due to "paludal exhalations," or marsh miasms, and objects to including, under the designation miasmatic, affections caused by emanations of any kind arising from the human body, giving as his reason that "there is no such relation between the two morbid causes as to render their association in one category desirable." (*Wood's Practice of Medicine*, 5th edition, vol. i. page 157.)

But, however true this statement may have appeared from the facts presented in private practice and in civil hospitals, the tendency of observations made during the present war upon the vast multitudes of patients suffering from diseases arising from these two sources, is to lead to a very different conclusion. In fact, the typhoid diseases, which may be regarded as the type products of the idio-miasmata, and the autumnal fevers, which may be looked upon as the type products of the koino-miasmata, are found complicating each other in the most various manners, and producing in patients, with constitutions impaired by camp diet (scorbutic tendency), mixed forms of disease, differing in important particulars from those with which our physicians had become acquainted in civil practice.

This mutual combined action would afford good

reason for following in this particular the example of the Statistical Congress rather than that of the distinguished American physician before quoted, even were it not true that the larger use of the word miasmatic is the ordinary signification given to it by most British writers.

In this work therefore the term will be used in the broad manner above indicated, and those intermittent and remittent forms of disease which are generally attributed to the effects of vegetable decomposition will be spoken of as malarial affections, and their unknown cause will be described as malaria, which is also the general usage of English writers.*

The list of miasmatic diseases, presented in the form of the monthly statistical reports of sick and wounded at present employed in the army, is as follows :—

Miasmatic Diseases.

Typhoid fever.
Typhus fever.
Typho-malarial fever.
Yellow fever.
Remittent fever.
Intermittent fever, { Quotidian. Tertian. Quartan. Congestive.
Diarrhœa, { Acute. Chronic.
Dysentery, { Acute. Chronic.

* See for example Watson's Lectures, American edition of 1858, page 474.

Epidemic cholera.
Erysipelas.
Hospital gangrene.
Pyæmia.
Smallpox.
Varioloid.
Measles.
Scarlet fever.
Diphtheria.
Mumps.
Epidemic catarrh.

Cases of any affections of this order not included in the above list are directed to be reported under the designation of *all other diseases of this order.*

For comparison, the following list of some of the affections included under "Miasmatic Diseases" in the statistical reports of the British army for 1859 and 1860, is here presented:—

Variola.
Varioloides.
Morbilli.
Scarlatina.
Diphtheria.
Parotitis.
Tonsillitis.
Cynanche trachealis.
Influenza.
Ophthalmia.
Erysipelas.
Erythema.
Dysenteria acuta.

Dysenteria chronica.
Diarrhœa.
Cholera biliosa.
Febris intermittens.
" remittens.
" typhoides.
" typhus.
" continua.
Anthrax.
Furunculus.
Pyæmia.
Rheumatismus acutus.
Rheumatismus chronicus.
Miliaria.
Pertussis, etc.

A comparison of this list with that employed in the United States army shows that while the term miasmatic diseases is used with us in the same general significance as that given to it in the statistical reports of the British army, some minor differences may be noted as to whether certain individual diseases should be grouped in this order.

Prominent among these minor differences, it may be noticed that in the form employed in the United States army, rheumatism is not only not placed among the miasmatic affections, but is not classed with zymotic diseases, being instead placed side by side with gout in the order Diathetic diseases, class Cachectici (constitutional affections). There can be little doubt that this is the proper place for true rheumatism, the pathological affinities of which are certainly rather with gout and other diathetic disorders, than the

affections of the miasmatic group. The attempts to connect the development of rheumatism with atmospheric influences have moreover long since exploded.

It is, however, unfortunately probable that a large number of the cases reported to the Surgeon-General's office, under the heads of acute rheumatism, chronic rheumatism, and lumbago, are not properly rheumatic diseases, but belong to the group described in Chapter X. under the designation of Pseudo-rheumatism, which embraces a vast number of cases of vague pains, resulting at times from the effects of typho-malarial fever, at times from simple malarial influence, sometimes from the scorbutic taint, and perhaps still more frequently from the combined influence of several of these causes, as will be seen in the sequel. These pseudo-rheumatisms undoubtedly are allied to the zymotic class, and should be grouped in the order of miasmatic diseases.

The second order of zymotic diseases, in both the British classification and that of the United States army, is designated *Enthetic Diseases* (enthetic, from ἔνθετος, put in, implanted). Under this head are embraced diseases which are communicated by inoculation only.

The tabular list of this order, given in the statistical report of the United States army, is as follows:—

Syphilis.
Gonorrhœa.
Gonorrhœal orchitis.
Stricture of the urethra.
Purulent ophthalmia.
Hydrophobia.

Glanders.
Bite of serpents.
All other diseases of this order.

None of these disorders will be described in this work, as none, in the author's experience, have as yet presented any special peculiarities to distinguish them from the same affections as seen and described in civil life. As the subject of the venereal disease is one of great interest in connection with armies, and as the question of its prevalence among the armies of the United States has been variously misstated, it would seem proper to give in this place the following statement of the actual prevalence of this affection in the armies of the United States during the first year of the rebellion.

During the year beginning July 1, 1861, and terminating June 30, 1862, 23,801 cases of enthetic disease were reported, the annual mean strength represented in the reports from which these figures were drawn being 281,177 men. Of these 23,801 cases, 20 were bites of serpents, 2 were reported under the head of all other diseases of this order, and 23,779 were venereal affections, reported under the following heads:—

Primary syphilis	6,359	cases.
Secondary syphilis	2,652	"
Gonorrhœa	11,638	"
Orchitis	2,722	"
Stricture of the urethra	408	"
Total	23,779	"

So that one soldier in every 12 (11·8) suffered from affections of this order. Of these the total of syphilis,

including both primary and secondary, was 9011 cases, or one in 31 (31·2). The total of gonorrhœa and its sequelæ (orchitis and stricture) was 14,768 cases, or one in 19. While it is true that in many instances the distance of the great camping grounds from cities has had its influence in producing this result, it must be admitted that when the loose mode of inspection of recruits, the liberal furlough system, and the general laxity of discipline which has hitherto prevailed in the armies of the United States, is taken into consideration, it is difficult to reconcile these figures with the idea advanced from many sources that syphilis prevails as extensively in the United States as in European countries. Compare for example the preceding statement with the condition of the British army in the United Kingdom as recorded in the statistical reports for 1859–60. In 1859 venereal diseases of every class are reported as having produced nearly one-half of all the admissions into hospital, the figures being "422 admissions into hospital on account of venereal among every 1000 men serving in the United Kingdom."

In 1860 the proportion admitted into hospital was 369 per thousand.

The average proportion of these two years would be more than one case to every three men (1 to 2·5) as contrasted with one to every twelve men (1 to 11·8) in our own army.

The third and last order of zymotic affections presented in the monthly statistical report of the United States army is that of *Dietic Diseases*, under which heading the following affections are included :—

Starvation.
Scurvy.
Purpura.
Delirium tremens.
Inebriation.
Chronic alcoholism.
Other diseases of this order.

The term dietic diseases—from *δίαίτα*, way of life, diet—signifies simply diseases arising from faults of food and drink. Of the affections above enumerated, *scurvy*, in its various degrees as an independent affection, and as a tendency complicating other diseases, is the only one which will occupy our attention in this work. Affections arising from the abuse of the alcoholic liquors may be dismissed with the general remark that they were comparatively rare, and that they presented no peculiarities in their phenomena. But 1634 cases of these latter affections, of which 656 were delirium tremens, are recorded in the reports above alluded to as representing an annual mean strength of 281,177 men.

To the foregoing remarks a few general considerations on the proportionate amount of sickness and mortality during the present war may be conveniently appended.

An analysis of the statistics of the sickness and mortality of the United States army for the year ending June 30th, 1862, shows that while the proportionate number taken sick has not very greatly increased, the mortality rate is double that of the old regular army, in time of peace, during eighteen previous years.

According to the published statistics of Assistant

Surgeon (now Medical Inspector) R. H. Coolidge, U. S. A., the average annual number treated in the United States army in time of peace, from 1840 to 1859 inclusive, was 2886 per thousand of mean strength. In this ratio, however, wounds and injuries are included. Rejecting these, the official figures show the average annual number under treatment for disease alone to have been 2558 per thousand of mean strength.

During the year ending June 30th, 1862, the number of cases treated, including wounds and injuries, was 3126· per thousand of mean strength, or 2966· per thousand for sickness only.

The annual mortality rate in time of peace, during the same period, is shown by Dr. Coolidge to have been 26 per thousand, including deaths from all causes, or 24 per thousand from sickness only.

During the year ending June 30th, 1862, the total mortality was 67·6 per thousand, or 50·4 per thousand from sickness only.

Regarding simply the ratios, which relate to sickness alone, it thus appears that while the proportionate number taken sick during the first year of the war was 15·7 per cent. greater than the average annual number in time of peace, the mortality from disease was increased about 100 per cent.

The amount of disease and the rates of mortality vary very considerably in the different geographical regions. Thus the Pacific coast, New Mexico, and the Department of the Northwest are far healthier than the Atlantic coast, and this again far healthier than the valley of the Mississippi. Without going into minute details, which will be fully presented in

the medical history of the war, the following table is presented, taken from a circular issued from the Surgeon-General's office, which gives separately the monthly number taken sick for the Atlantic and Pacific borders, and for the great central region of the continent.

Monthly Sickness Rates of the Armies of the United States during the year ending June 30, 1862, *expressed in ratio per thousand of mean strength.*

1861.						
	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Atlantic border.....	391·35	372·18	298·26	267·14	255·90	230·99
Central region	258·65	356·91	325·40	326·11	300·24	305·71
Pacific border.....	198·91	200·37	245·27	210·19	279·39	198·84

1862.							
	Jan.	Feb.	March.	April.	May.	June.	For the year.
Atlantic border.	200·34	183·33	167·25	214·52	208·45	239·75	2749·39
Central region..	323·55	249·85	252·61	284·32	259·70	232·83	3368·14
Pacific border...	201·13	258·27	236·67	136·08	157·47	193·51	2586·60

The contrast between these regions is still more striking when their mortality rates are compared; from the following table it will be seen that the annual mortality rate of the armies on the Atlantic coast, was more than three times greater than that of the troops on the Pacific slope, while in the central region of the continent it was more than two and a half times greater than on the Atlantic border.

Monthly Mortality Rates of the Armies of the United States during the year ending June 30, 1862, *expressed in ratio per thousand of mean strength.*

1861.

	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Atlantic border.....	2·00	2 06	1·79	2·04	2·68	3·24
Central region	1·02	2·73	3·49	4 66	6·36	6·61
Pacific border.....	1·45	1·48	1·18	1·54	1·43	0·91

1862.

	Jan.	Feb.	March.	April.	May.	June.	For the year.
Atlantic border.	2·93	2·43	2·58	3·16	3·27	3 53	33·40
Central region..	8·68	9·24	10·66	6·67	7·40	6·15	80·68
Pacific border..	0·21	0·44	1·03	0·36	0·00	0·44	10·76

In the following pages, it is not intended to attempt to treat of all even of the zymotic diseases from which the army has suffered. To do so would swell the volume to unnecessary bulk, and would lead inevitably to much repetition of what has been said elsewhere better than the author could hope to say it here. His endeavor will be simply to seize upon the leading phenomena of those diseases which are most characteristic, present features variously transformed from those worn by the ordinary affections of civil life, and which, from the vast frequency with which they have occurred, and are occurring, are of the greatest importance to the military surgeon. The affections considered will be some of the more important fevers, jaundice, diarrhœa, measles, catarrh, pneumonia, and pseudo-rheumatism.

Before proceeding to these subjects, certain general etiological considerations demand attention, and these will be briefly presented in the next chapter.

CHAPTER II.

CONDITIONS DETERMINING THE CHARACTER OF CAMP DISEASES.

SECTION I.

Malarial Influence.

THREE wide-spread and powerful influences underlie and determine the character of by far the majority of camp diseases in America. These three influences are malaria, crowd poisoning, and the scorbutic taint. They represent in fact the effect on man of three categories of conditions—climate, mode of life, and food. The intermittent fevers may be named as the typical result of the first of these influences, typhus and typhoid fevers of the second, scurvy of the third. And these three influences, variously combined, will appear continually as determining or modifying conditions, if not always as the causes of all the affections considered in this work. Sometimes but a single one of these causes is recognizable in the results produced, more frequently two, and perhaps in the great majority of cases all three of them are variously combined. A brief resumé of what is known of these three influences as causes of disease is indispensable therefore in this place, as a preliminary investigation.

The influence of *climate* in determining the character of disease is well known. It has long been observed that many diseases have geographical limits as definite and oftentimes as difficult to account for as the boundaries of the various Floras and Faunas of the world. In all such cases of geographical limitation, moreover, the inhabitants acquire a certain degree of tolerance which enables them to resist the morbific influence much better than is done by strangers. When then it is considered that almost all the United States troops actually engaged in the present struggle are exposed to a more southern climate than that to which they are accustomed, and in a general way to climatic influences unlike those of their homes, it might be expected that this would serve as a potent source of disease. This expectation was in fact largely indulged at the breaking out of the struggle; and while thoughtful and patriotic men could not avoid feeling the most earnest anxiety as to the results of the exposure, the Southern press was loud in its boastful prophecies of the ruin which the destructive climate of the South would bring upon our armies. These expectations have, however, happily been realized only to a very limited extent. Yellow fever, the peculiar disease of the extreme South, has not yet attacked our armies, except on a very small scale at Key West, Florida, and Hilton Head, South Carolina, in the latter part of the summer of 1862; and the autumnal fevers, whose fatal effects were relied upon by the enemies of the country to destroy our forces, have been rendered comparatively innoxious by the liberal administration of the salts of quinia.

At the same time it cannot be denied that a very

large amount of malarial fever has actually occurred, and that the malarial tendency is manifest to a still greater extent, either alone or as a condition complicating some other affection.

Malaria, or *marsh miasm*, is a cause of disease concerning the nature of which much has been written, but in connection with which very few facts are actually susceptible of demonstration. It may be defined to be the unknown cause of intermittent and remittent disease. The essential condition of its existence is usually affirmed to be vegetable decomposition; but as to the mode in which this may act, the most diverse statements have been made. Thus by some a subtle gas or gaseous compound is supposed to be developed during vegetable decomposition, which, acting upon the economy through the respiratory tract chiefly, produces the disease. By others, changes in the electrical condition of the atmosphere are regarded as the efficient agent; while yet a third class believe it is due to the development and circulation through the atmosphere of hosts of the spores of cryptogamic fungi. When these opinions are scrutinized, however, candor compels the statement that at the present moment, specious as they may appear, and conveniently as they may serve for the explanation of the phenomena of these diseases, they are all as yet equally undemonstrated, and without any actual foundation in fact.

There are not wanting those who go still further, and affirm that the chain of evidence which has been relied upon to demonstrate the dependence of malaria upon vegetable decomposition is imperfect, and that this opinion is incompatible with many of the pheno-

mena noted in connection with malarial diseases, such as for example the undoubted fact that these complaints have been observed in mountainous districts, in barren islands, and in other locations in which the amount of vegetable decomposition present, is apparently much less than in many locations completely free from affections of this class.

It is not intended in this place to enter elaborately into the arguments advanced by the advocates of these different theories. The practical medical man is chiefly concerned with the facts upon which they rest. An acquaintance with these is frequently of use in devising measures of precaution and prevention, if not of cure.

The prominent facts which appear to favor the idea that malarial affections are due to influences dependent upon vegetable decomposition are the following:—

These diseases only occur in regions in which the summer heat is sufficiently great and prolonged to produce vegetable decomposition to a marked degree. Thus they seldom occur north of 56° north latitude, and south of that parallel they increase in intensity as the equator is approached. So that the malarial fevers of the Middle and Northwestern States, for example, seem comparatively mild when compared with the malignant character which these diseases assume in more southern latitudes.

In temperate regions, moreover, these fevers prevail most abundantly toward the close of the summer and throughout the autumn, when the warmth of the season has had time to operate upon the decaying vegetation, and diminish in frequency and intensity,

often almost disappear, after the winter frosts have set in.

It has also been observed that the deltas and alluvial margins of great rivers, the borders of tropical streams, the neighborhood of extensive marshes and swamps are the favorite habitations of these maladies, and that they occur in such localities with peculiar violence.

They have been observed to break out in regions previously healthy, after the overflowing of more or less extensive tracts of land in consequence of the building of dams across streams; and such regions have—after a considerable lapse of time, such as might be supposed to be required for the complete decomposition of the submerged vegetation—again become healthy.

In like manner the draining of ponds and marshes, and the exposure of the soft slime of their beds to the decomposing influence of the sun's rays, has been observed to be followed by the development of the disease.

The first cultivation of virgin soils, rich in organic debris, has frequently been found, in the experience of Western settlers especially, to produce the same results.

It is not necessary to multiply facts of this character, as might be done to a very considerable extent. Those already adduced, for which there is abundant evidence, and most of which are matters of common experience, are sufficient to show the broad basis on which rests the argument in favor of the theory of the production of these diseases by the effects of vegetable decomposition.

On the other hand, however, it is asserted that statistics show that although the disease prevails most extensively during the summer and autumn, yet cases occur, and that too in considerable numbers, at all seasons of the year, and that a decided increase, both in their number and severity, is often observed in the early spring as well as in the fall, so that the annual course of the disease is, in many localities at least, a double wave with two periods of special intensity, a vernal and an autumnal, which ought not to result if vegetable decomposition alone were the cause.

Occasionally also malarial diseases make their appearance epidemically in regions in which they are not usually present, and this with a severity which bears no observed relation to the temperature, moisture, or other characters of the season.

But the strongest argument of those who do not believe vegetable decomposition to be the cause of malarial fevers, is founded upon the fact that these fevers occur not only in situations in which decomposition is evidently occurring, but also in places where it is difficult to conceive that any notable source of vegetable decomposition exists. They have been observed, for example, in all their intensity in barren mountainous districts, and in low sandy regions almost or quite devoid of vegetation, and remote from any of the conditions usually regarded as necessary for their production.

Some of the instances most frequently quoted in the controversies upon this subject are the terrible prevalence of malarial fevers among the troops of the British expedition to Walcheren, where all the usual

accompanying conditions supposed to be essential were wanting, the pestiferous character of the sandy shores of the Alentejo opposite Lisbon, and the experience of the British army in Spain in the early part of this century. Instances very similar to these, but on a smaller scale, have, moreover, been observed at various points throughout the Southern United States.

Facts of this character have led many respectable writers—among others Dr. Watson, of King's College, London, whose lectures have been read to a considerable extent in this country—to arrive at the conclusion that although vegetable decomposition and malarial fevers frequently appear in connection with each other, they have no necessary genetic relation.

The author is far from being inclined to attempt to enunciate dogmatically any solution of this question; but while admitting freely the *facts*, as adduced on both sides as the basis of their arguments, he is constrained to state that, in the United States at least, the coincidence of such sources of vegetable decomposition as have been above described, with malarial disease appears to be the rule, and its existence without recognizable influences of the kind to be the exception; so that even although the prudent reasoner may hesitate to affirm the dogma that vegetable decomposition *causes* the fevers of this class, it is impossible not to admit it to be *one of the most important of the determining conditions.*

The facts upon which the various hypotheses as to the *essential nature* of the malarial influence are based are much more slender than those which underlie the foregoing argument. Those who believe it to consist

of a noxious gas developed during vegetable decomposition, appeal in favor of their doctrine to the well-known fact that gaseous bodies of the most varied composition are the products of vegetable decay; and that some of these, such as sulphuretted, carburetted, and phosphuretted hydrogen and the like, have been detected by analysis in the air of marshy places. But the toxical effects of such hurtful gases as have actually been demonstrated to be produced in such localities are well known, and do not at all correspond with the disorders under consideration; and a candid reader of the arguments of those who advocate this theory is compelled to conclude that however specious it may appear, the facts upon which the doctrine rests are too slender to be the basis of any well-grounded theory.

The same may be said with regard to the opinion advanced, that these disorders may be due to changes in the electrical condition of the atmosphere, which, in the present state of our knowledge of atmospheric electrical states, is to be regarded as purely conjectural. That these electrical changes, either directly or by altering the dynamical condition of the atmospheric oxygen, resulting in the increase or diminution of the quantity of ozone, may exercise a profound influence in the production of febrile disease, appears very probable, and the subject is well worthy of the most earnest investigation; but the few scanty, incomplete, and isolated facts which have hitherto been collected are not sufficient to justify the premature conclusions at which some have arrived.

Somewhat more plausible appears the idea that the malarial influence is in reality due to the presence in

the air of malarial districts of numbers of microscopic vegetable spores—a doctrine which serves sufficiently well to explain many of the peculiarities observed in the habits of these affections. This doctrine, which has been elaborated into a very ingenious treatise by Prof. J. K. Mitchell, of Philadelphia, has obtained a certain degree of popularity, and has served with many also to explain the nature of epidemic diseases of every kind. But, unfortunately, although microscopic observation has shown that in marshy regions the spores of various cryptogamic organisms may frequently be detected in the atmosphere, the observations are not of such a character as to prove either that these are always present where malarial diseases exist, or that any connection exists between the two classes of phenomena. The subject is one well worthy of further investigation; but the little at present positively known is not sufficient to enable a candid inquirer to accept the cryptogamic theory of the origin of malarial disease.*

After careful study of the various arguments advanced, the unprejudiced mind is compelled to arrive at the conclusion that we are not yet in a position to frame a satisfactory theory of the real nature of the malarial influence, and the cautious investigator will prefer to collect the facts observed by all parties without committing himself prematurely to the opinions advanced by any. Certain of these facts which may be regarded as illustrative of the habits of the mala-

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* In this connection attention may be directed to the investigations of Dr. Salisbury, of Newark, Ohio, into the Cryptogamic Origin of Measles. See Chapter VII.

rial influence, are of practical importance from the hygienic point of view, and may be advantageously mentioned in this place in addition to those which have been already alluded to.

Thus, for example, in the regions in which malarial diseases occur, exposure to the night air, from sunset till at least an hour or so after sunrise, appears to be peculiarly injurious, and those who carefully avoid such exposures are less liable to the disease. Many extremely unhealthy regions—for example, the rice plantations around Charleston, South Carolina—may be visited with impunity during the day by the residents of healthier localities, but to pass a night there is deadly. Those who must necessarily be exposed at an early hour in the day seem more likely to escape if they eat before exposing themselves. This fact has been acted upon practically by some of the armies of the United States during the present war with beneficial results. Orders issued at the instance of the surgeons, by the generals in command, have, in a number of instances, directed that the men shall have coffee and biscuit immediately after reveille in the morning and before proceeding to any exercise or exposure.

It has been noticed that in the neighborhood of localities of a decidedly malarial character, the affections of this class prevail often with greater or less energy in accordance with the direction of the prevailing winds. This has been observed in the neighborhood of swamps, marshes, and river bottoms, to an extent which justifies the idea that the malarial influence can be transported from place to place by the wind. Groves and forests interfere with this

aerial transportation of the malarial poison. Certainly, at least, the hewing down of timber between dwellings or hospitals and an adjacent marsh, has frequently been followed by an outbreak of these diseases, although previously unknown in the situation. The practical indication as to the preservation of timber under such circumstances is not to be overlooked. The location of a camp in the neighborhood of a malarial river bottom or swamp may also advantageously be regulated by a knowledge of this fact.

Another point of interest is the circumstance that while, as has already been mentioned, the first breaking up of the soil for the purposes of cultivation is frequently followed by an appearance of malarial diseases or an increase of those which already existed, the continued progress of cultivation, accompanied as it is by improved drainage and a thicker settling of the new region, is attended by a diminution of these diseases, which ultimately may even cease to exist. The built up portions of cities of any size are consequently exempt to a remarkable degree. It has also been stated that regions in which, under the influence of cultivation, malarial diseases had almost vanished, become once more unhealthy if from any cause they are depopulated and laid waste.

The relation of the prevalence of malarial diseases to the amount of atmospheric moisture is also a subject of considerable interest. It is, as a general rule, not during but after the prevalence of wet weather that these affections show most virulence. In the tropics the most fatal season is the period of heat which follows immediately upon the rainy season.

Wet summers are not, as a general rule, accompanied by an increased prevalence of these diseases. On the contrary, dry and prolonged hot weather of great intensity is most generally the condition which accompanies their unusual frequency.

Finally, it may be stated as a matter of interest that the malarial influence acts with greater intensity near the surface of the earth than some distance above it. And many instances are recorded where the occupants of the lower stories of buildings continually suffer from these complaints, while those of the upper stories escape.

Such are some of the leading facts at present in our possession with regard to the behavior of the malarial influence, and those which are chiefly relied upon by such as have attempted to expound its nature. Rejecting entirely in this place the attempt to frame a theory which shall embrace consistently all these facts, the remainder of this section will be limited to a brief enumeration of the principal diseases which may result from the malarial influence.

The chief of these affections are those designated under the generic title of *malarial fevers*, and these may be either *intermittent*, *remittent*, or *continued*. The intermittents chiefly prevail in northern and temperate, the remittents in warm temperate, and the continued in tropical latitudes.

The three forms of fever are, however, intimately associated. Intermittents occur in tropical climates, and continued fevers of malarial origin may occur as far north as intermittents are known to exist.

Nevertheless, in a general way it may be stated

that all these forms of disease increase in severity, intensity, and fatality, in proportion as the equator is approached.

Moreover, intermittents may pass into remittents, and remittent fever may become continued in the same patient and during the same attack; the frequency of this transformation increasing in southern latitudes, and the reverse also taking place, continued fevers passing into remittents, and these into intermittents, especially when patients suffering from them are transported to a more northern climate.

Diarrhœa and *dysentery* are also frequently of malarial origin, the patients presenting evidences of malarial poisoning, and being benefited or cured by the administration of the same class of remedies that experience has found most useful in the fevers of paludal origin.

Various other diseases may be induced by the same cause, especially *gastric* and *hepatic disturbances*, and a form of neuralgia, which is sometimes confounded with rheumatic disease, and which will be alluded to hereafter among the forms of *pseudo-rheumatism*. Besides these chief affections, those who inhabit malarial regions frequently present a certain amount of constitutional disturbance independently of the actual development of any prominent disease. This condition, which may be described as the *malarial cachexia*, or as *malarial poisoning*, is manifested by a sallow or yellowish complexion, generally accompanied by more or less emaciation, with disturbed bowels, disordered appetite, yellowness of the conjunctiva, torpor of the intellectual functions, debility, and a disinclination to exertion of every kind; œdema or dropsical effu-

sion sometimes occurs in this condition. Careful physical examination in such cases frequently detects enlargement of the spleen, and occasionally of the liver. A microscopical examination of the blood generally demonstrates an abnormal preponderance of the white corpuscles. The red corpuscles, on the contrary, are diminished in number, are pale, and, when observed under the microscope, do not exhibit the tendency to adhere in nummular rolls which is observable in the blood of individuals in robust health.

The several morbid conditions thus briefly enumerated attack males and females of all ages in civil life, and the phenomena observed do not differ from those which may occur in armies exposed to the same influence. The whole subject would, therefore, have been passed by in silence in the present treatise, if it were not for the fact that in armies other causes of disease exist on a great scale, which complicate and variously modify the ordinary manifestations of malarial disease.

For the appreciation of these diverse modifications liberal notions on the subject of malaria are indispensable, and narrow or one-sided ideas are not only philosophical errors, but lead to the practical misinterpretation of phenomena and to errors in diagnosis and therapeutics which larger views of the subject enable the practitioner to avoid.

SECTION II.

Crowd Poisoning.

The mischievous effects of overcrowding may be manifested in a variety of ways, differing in accordance with the degree of the evil and the period during which individuals are exposed to it. The air of crowded cities, camps, and habitations becomes contaminated through emanations given off during respiration, through effluvia from the skin and by the decomposition of the various normal and abnormal excreta. When great numbers of individuals are crowded together within very narrow limits, the consumption of atmospheric oxygen and the substitution of carbonic acid in the ordinary process of respiration may take place to such an extent as even to induce fatal results, which has happened on more than one memorable occasion. When the crowding is less extreme, however, the danger arises from a very different source. The nitrogenized matter carried into the air from the skin, and the products arising from the decomposition of the excreta are now the chief sources of mischief, and these, though not so rapid in their action as the conditions of the category first mentioned, are ultimately quite as deadly. The effects of overcrowding are not only manifested by the increased violence and the adynamic character of all diseases occurring among those exposed, but the development and severity of the adynamic fevers appear peculiarly connected with this cause.

To this group of diseases belong at least three

prominent affections—typhoid fever, typhus, and Oriental plague, which are intimately associated in their nature, and of which typhoid fever may be regarded as the mildest and plague as the most severe.

Oriental plague has never occurred in the United States. Typhus has appeared at various times, especially in the great Eastern cities, and in connection with the ship fever of emigration. But although a considerable number of cases of fever have been reported under this head in the armies of the United States during the present war, doubts may be entertained as to whether the cases thus designated are identical in their nature with the affection known as typhus in Europe.

Typhoid fever, by far the most common of the disorders of this group, has, however, always been exceedingly frequent in the United States, and in fact in the middle and northern portion is the continued fever most usually encountered, prevailing in the country as well as in the cities, although far more constantly in the latter localities; so that while it may be said that it is very often epidemic in the country, or even for a time endemic in certain localities, in the cities it may be described as permanently endemic, with occasional periods of epidemic intensity.

Both typhus and typhoid fevers were exceedingly rare in the United States army prior to the present war. In the published statistics* of eighteen years,

* Statistical Report of the Sickness and Mortality of the Army of the United States, compiled from the records of the Surgeon-General's office, by Assistant Surgeon R. H. Coolidge, in two volumes.

but 917 cases of typhoid and typhus fevers are reported out of an average annual mean strength of 10,397 men, which is at the yearly rate of about 5 (4·9) cases per thousand of mean strength, or half of one per cent.

During the present war, however, the number of cases reported under the head of typhus and typhoid fever has prodigiously increased, 22,801 cases having been reported during the year ending June 30th, 1862, in an annual mean strength of 281,177 men, being 81·1 cases per thousand of mean strength, or about 8 per cent. It is true, as will be seen hereafter, that the great majority of this host of cases were far from being merely the simple uncomplicated enteric or typhoid fevers of civil life. They were variously complicated with malarial or scorbutic phenomena or both, and this oftentimes to such a degree as to compel the recognition of a mixed type of disease deserving even a new name. Yet in general adynamic characters and in the nature of the intestinal lesion, the camp fevers of the army have presented so many analogies to typhoid fever as to show that the causes which produce that affection in civil life were operating in full force, although the resulting pathological condition was modified by the operation of other morbid influences.

These causes are especially to be sought in overcrowding, imperfect ventilation, and want of cleanliness, or—as it is characteristically termed by army surgeons—bad police. These three conditions are usually associated, and may be designated by the single term "crowd poisoning."

In cities the fevers which arise from this cause are most frequent and fatal in the dirty, overcrowded,

and badly ventilated dwellings of the poor; and those cities appear to suffer most in which the buildings are most crowded together, and in which the drainage and sewerage are most imperfect, while any improvements in these particulars are speedily followed by a diminution in the frequency and intensity of the fevers of this class.

The direct relationship thus shown to exist between the neglect of hygienic precaution and the prevalence of disease is still more palpable in the case of armies; and, unfortunately, all the determining conditions of these diseases exist to a high degree in great armies in time of war.

Crowding is a condition present in all great encampments. Thousands of men are frequently, from military necessity, aggregated together in a comparatively limited space. The great camps of the army of the Potomac before Washington during the fall and winter of 1861–2, before Yorktown during April, 1862, on the Chickahominy during June, and at Harrison's Landing during July and August of the same year, the encampments at Cairo and before Corinth in the West, are examples of this condition on a gigantic scale.

Under such circumstances the immense population, resembling that of a great city, congregated upon an area even less than that which a city of equal population would occupy, is deprived of all those advantages of drainage and sewerage which great cities usually enjoy in civilized countries. But not only is the actual population per acre too great for health, the men are crowded together in their tents in a most unhealthy fashion. This was undoubtedly true to a greater extent during the first year of

the war than subsequently. During that period Sibley tents, bell tents, and wedge tents were those most generally in use. The Sibley tent is conical in shape, 18 feet in diameter, 13 feet high, giving 1102 cubic feet of air space. Often as many as twenty or twenty-two men were sheltered in one of these tents; and this not merely upon the march, where the transportation of a large number of tents is difficult or impossible, but in great encampments, occupied for many months, in the immediate neighborhood of the government storehouses. In the West a tent called the bell tent was used, shaped like the Sibley tent, but without the opening for ventilation at the apex. Another tent very frequently used was the common wedge tent, which is 6 feet 10 inches long, 8 feet 4 inches broad, and 6 feet 10 inches high, giving a total cubic capacity of 194 cubic feet; six men occupied one of these tents in a large number of cases.

Nor did such of the troops as spent the first winter of the war in barracks fare any better. The barracks erected for this purpose in Baltimore, Washington, and elsewhere, hastily constructed to meet a temporary emergency, were in almost every instance overcrowded. Fortunate were those who were so situated as to get between two and three hundred cubic feet of air space.

With the commencement of the summer campaign of 1862, however, a new policy was inaugurated. Ponchos* and shelter tents were issued to several of

* Square pieces of oil cloth, with a slit in the center through which the head can be thrust; they thus serve as a mantle. The ponchos of two soldiers, properly put together, form also a shelter tent.

the armies in the field, they were disembarrassed of their heavy and cumbersome tents, and have never since resumed them.

The winter of 1862–3 was spent by the army of the Potomac in bivouac with such rude shelters as the men could improvise of logs, brush, and mud, with the use of the poncho or shelter tent for the roof.

This change has been found a beneficial one, but is still far from being beyond criticism. The construction of such temporary huts is left too generally entirely to the men, who are of course ignorant of the hygienic principles to be respected. Several combine to build a hut in which in the winter time two ideas only dominate: the first is to keep dry, the second to keep warm. The questions of air space and ventilation are never thought of. Much could be done by medical officers in the field to improve the character of these rude shelters.

The use of tents, however, has not been entirely abandoned; they still continue to be employed in the armies of the West, as well as for hospital purposes and for stationary commands.

Want of ventilation has been a conspicuous defect of all these several modes of sheltering troops. It has as a general rule been almost as deficient in the tents as the barracks, especially during the winter of 1861–2, when the pernicious habit of using tent stoves was so common. The Sibley tent, it is true, has an opening at the apex left for the special purposes of ventilation, but when the door of the tent is closed there are no adequate apertures by which air can enter to feed the upward current with sufficient

rapidity to secure adequate change of air for the usual population of one of these tents.

The barracks referred to as having been constructed during the first winter of the war were, as a general rule, built without regard to any proper theory of ventilation. Constructed usually of rough boards, the floors laid upon the ground, the roofs low, usually one, but occasionally two stories high, the windows were small, the openings for ventilation, when any existed, insufficient, and the bunks generally erected in tiers two stories high. The hygienic condition of the occupants of these barracks must be regarded as having been altogether less favorable than that of those who occupied tents. Still worse was the condition of those troops who occupied dwelling-houses, stores, etc. for winter quarters. Ill ventilated, overcrowded, and not adapted to the purpose, the increased sickness rates of troops thus quartered became the subject of numerous official communications from medical officers to commanding generals.

Want of cleanliness and bad police are not always the result of neglect and indifference. In great armies in time of war facilities for personal cleanliness are often far from being all that could be desired, and bad weather, military necessity, and other causes frequently interfere. Nevertheless, it is too true that as a general rule these important points do not receive the attention they deserve. Cleanliness may be deficient in the clothing and persons of the men, in their tents or barracks, in the streets and open spaces of the encampment and in its environs. How often, especially in the winter time, are the men unwashed, their clothes filthy, their bodies full of ver-

min, and heaps of garbage piled about the camp and its neighborhood! The incessant efforts of the medical department, and of commanding generals wise enough to recognize the importance of hygienic precautions, have, it is true, since the commencement of the war, greatly bettered this state of affairs, but there is still considerable room for improvement.

Especially is there room for improvement in the police of the latrines. Camp latrines are trenches which should always be constructed at a sufficient distance, at least a hundred yards, from the encampment, and on the side opposite to that from which the prevailing winds blow. Each trench should be about 10 feet long, 3 broad, and 5 deep. A forked stick is to be driven in at each end of the trench and a pole laid on it, upon which the men sit. Every morning a part of the earth removed in digging the trench is to be thrown in, so as to cover completely the deposits of the previous day. When the trench is two-thirds full it should be covered to the surface with earth and a new one dug. Unfortunately these necessary precautions are too frequently neglected. The trench is generally too shallow when first dug; the daily covering in with earth is entirely neglected or very imperfectly performed; sinks full to overflowing are allowed to remain, and the construction of those which are to replace them is unnecessarily delayed. The result is, the sinks become excessively offensive even in the winter, and to a much greater degree, of course, in summer. Frequently it is impossible to approach them without nausea. Large numbers of the men will not use the sinks under these circumstances, and every grove, every clump of bushes,

every fence border in the vicinity is resorted to for the purpose. The atmosphere in the neighborhood of great encampments is too often redolent with ill odors derived from this source. It is impossible to take a step outside of the limits of the encampment, especially through any adjoining woods, without having both eye and nostril continually offended. And this is so much the more unfortunate when it is considered that the excreta, in large numbers of cases, are abnormal. The air is poisoned by putrid exhalations from the liquid discharges of diarrhœa, dysentery, and fever cases.

To these sources of disease must be added neglect of precautions as to the offal of cattle slaughtered for food. This should always be carefully buried. Too often, however, it accumulates neglected upon the surface, or is so incompletely interred as but imperfectly to interfere with the dissemination of the aerial products of decomposition. The same remarks too frequently apply to dead horses and mules, and occasionally, after great battles, to a certain extent to the bodies of the slain.

Such are some of the conditions existing in great armies which give rise to what is in this work included under the general designation of crowd poisoning.

It may be regarded as established beyond the possibility of a doubt that the reunion of these conditions favors, in proportion to the degree in which it exists, the development of adynamic fevers, while their progress may be greatly mitigated and their severity diminished by proper precautions as to these particulars. Many circumstances might be quoted

from the history of the present war in illustration of the bad effects of overcrowding and its attendant evils. A single one will serve as an illustration. Surgeon J. H. Brinton, U. S. V., has informed the author that in March, 1862, a few weeks after the capture of Fort Donelson, the army of General Grant embarked in some seventy steam-boats of every size, under command of General C. F. Smith, to ascend the Tennessee River. From deficiency of transportation they were crowded into the boats with but little regard to sanitary precautions. Circumstances compelled this force to remain on board some ten days or two weeks. During this period the fever cases increased greatly in numbers, and assumed a degree of severity which caused considerable uneasiness to the medical officers of the expedition. Immediately after their disembarkation, however, the fever diminished materially in both the number and severity of the cases. Facts of this class might be multiplied to any extent, but this single illustration must here suffice.

Although, however, the general fact that the conditions above alluded to favor the development of adynamic fevers cannot be denied, the careful investigator finds himself continually in the presence of phenomena which compel him to doubt whether these conditions are the only cause of adynamic fevers generally, and especially of the camp fevers of the armies of the United States during the present war. Most army surgeons have noticed, during the past two years, occasional instances of regiments encamped side by side, in which the number of fever cases was precisely the reverse of what

might be expected if crowd poisoning were the only source of the disease. A question also will arise in the minds of those who have studied attentively the history of other armies, as to why it is that the disease produced under the circumstances of crowd poisoning above described is not always the same. For although it is easy to account for the fact that it is sometimes typhoid and sometimes typhus fever which occurs, by adopting the doctrine of those who suppose that the latter is due simply to the same causes as the former, but acting with greater intensity, yet the fact that the disease which appears is sometimes diarrhœa, dysentery, or cholera, is not so readily explained away.

It therefore appears probable that, in addition to the sanitary evils which to a great extent determine the prevalence and severity of camp fevers, there are other co-operating causes, some of which are readily appreciable, while perhaps others are not so easily attained. Among the former it seems reasonable to place the malarial influence and those dietetic errors common to a greater or less extent to all armies, and which in their highest degree produce scurvy. The co-operation of these causes with crowd poisoning in producing the mixed forms of fever actually encountered in our army will be discussed in the chapter on camp fevers.

In addition to the determining hygienic conditions above sketched, which are broadly recognized in Europe at the present day as regulating the intensity of camp fevers, it is there very generally believed that both typhoid and typhus fevers are contagious affections. The doctrine of the contagiousness of

typhus has hardly met with serious contradiction. In the case of typhoid fever, however, many continental and some English observers have arrived at an opposite conclusion, and an active controversy has resulted.

Prominent among those who believe in the contagion of the latter affection, is Dr. William Budd, of the Royal Infirmary of Bristol, who has proposed an exceedingly ingenious theory of the origin of typhoid fever, which, if correct, would make attention to the state of the latrines still more important if possible than it appears to be from the purely hygienic point of view.

This gentleman, who not only affirms that typhoid fever is contagious, but insists that it cannot be developed in any case except by contagion, has published some very ingenious papers on the subject in the *London Lancet* of 1859. According to him, typhoid fever, like smallpox, leads to the development of a specific contagion, which is capable of acting through the air without actual contact between the infecting and the infected individual. There is, however, this difference, that while in smallpox the specific local process is in the skin, and the contagious material passes directly thence into the air, in typhoid fever the specific process is in the mucous membrane of the small intestine, and the contagion therefore emanates from the dejections. It is not that the emanations from ordinary human excrement produce or aid in producing the disease, but that the emanations from the excrement of patients laboring under typhoid fever is its efficient cause.

Dr. Budd's language on this subject is of the most

positive character. He speaks of the dejections in these cases as being "charged with matters, on which the specific poison of a contagious fever has set its most specific mark," and observes, "to inhale sewer emanations is, therefore, under conditions of the most frequent occurrence, *actually to inhale the very quintessence, so to speak, of a pre-existing fever.*"*

A careful perusal of Dr. Budd's papers, however, discovers no facts which can serve as reasonable evidence for this ingenious hypothesis, all the circumstances brought forward as conclusive being such as might be used with equal force by advocates of any other theory of contagion, and readily explained by those who deny the doctrine of contagion altogether. At the same time it appears highly probable that the liquid evacuations of disease, including perhaps diarrhœa and dysentery as well as fever, are more pernicious in their influence on the human system, as they are certainly more offensive than the healthy fecal discharges.

In America the leading practitioners have so completely abandoned the idea that typhoid fever as manifested in civil life is a contagious affection, that the question need not be discussed in this place.

The continued fevers of the army during the present war, whether designated typhoid, or, as appears preferable, typho-malarial, have certainly presented no phenomena to justify a belief in the possibility of contagion. The whole weight of the facts is in favor of the opposite view, and the general tenor of the

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* On Intestinal Fever. By William Budd, M.D. London Lancet, Nov. 1859.

opinions and the practice of army surgeons is against the contagion theory. While separate hospitals have been carefully established for measles and variolous disease, the fever cases have been invariably sent indiscriminately to the general hospitals with other diseases and wounds. They have been treated side by side, and however injudicious this course may have been in the case of the wounded, it has produced no bad effect upon the sick.

It is true that the physicians and the various attendants resident in the great army hospitals have occasionally suffered from the disease. It is also true that cases of fever have, from time to time, originated in these hospitals among patients brought there for other diseases. But such instances have not occurred with the uniformity which would be anticipated in the case of a contagious disease, and have generally been noticed in those hospitals in which great numbers of sick have been aggregated together in buildings ill suited to the emergency, in consequence of some necessity arising out of military movements, and where overcrowding, imperfect ventilation, and bad police were reunited to a marked extent. Moreover, large numbers of patients, especially sick officers, have gone from the army to their homes, in all stages of fever, and remained until their recovery. Surely, if the disease deserved the name of contagious, each of these patients should have served as the means of transmitting it to some at least of their neighbors or friends. If, indeed, such instances have occurred, they must have been exceedingly rare, for none of them have been brought to the knowledge of the writer; and Dr. Meredith Clymer,

U. S. V., who during more than a year has occupied the important post of attending surgeon for sick officers of the volunteer service in Washington City, and who during that time has attended many hundreds of officers received from the army in all stages of the disease into hotels, boarding-houses, and private families, has informed the author that he has not in a single instance during this time observed any phenomena which would justify the doctrine of contagion.

If, in fact, the circumstances attending the appearance of this disease among troops in the field be compared with those attending affections of a truly contagious disease, say for example camp measles, which has occurred so largely in the United States armies, the two series of phenomena will be found to be utterly unlike. Measles imported into a regiment by exposure to pre-existing cases, an exposure which in most instances can readily be traced, speedily runs through the command, attacking every one susceptible to the disease who has not previously suffered. A large number are seized in a comparatively short time. The disease exhausts the material offered to it and disappears altogether, not to reappear again in the course of the regimental history, unless recruits join who have not had measles, in which case they are of course liable to it if exposed. Strongly contrasted is the behavior of continued fever. Isolated cases or groups of a small number of cases occur, from time to time, during months and years, at any period. Especially under circumstances attended by an aggravation of the conditions above indicated, an outbreak of the disease to an unusual extent may take

place, and this again may be followed by the ordinary condition of occasional attacks. The disorder may even disappear altogether, and new cases be developed at a subsequent period under circumstances in which it is difficult if not impossible to conceive that it could have been transmitted from any existing source of contagion.

SECTION III.

The Scorbutic Taint.

Scurvy has been in every age one of the leading diseases of armies. Eminently preventable, it was hoped that with the precautions taken in accordance with the teachings of modern sanitary science our own army would have escaped. In fact, the statistical table presented by the Surgeon-General to Congress in February, 1863, shows a smaller proportion of recorded scurvy than is exhibited by the records of any great army that ever took the field, the reports representing only 4·7 cases per thousand of mean strength, and one death per 35,000 of mean strength, for the year ending June 30th, 1862.

But it would be a mistake to suppose that these figures represented the whole influence on the army of the unhealthy conditions which, acting in their highest degree, produce scurvy.

Every writer of observation, in describing the severe epidemics of scurvy with which other armies have been visited, has called attention to the fact that, besides the cases in which the symptoms of fully developed scurvy exist to such a degree as to lead

surgeons to call the disease by that name, the scorbutic influence shows itself as a modifying agent in the diarrhœas, dysenteries, and other camp diseases from which the army may suffer; and in truth large numbers of cases show only the preliminary symptoms of the early stages of scorbutic disease thus variously complicated, the further progress of the disorder being arrested by the resisting power of the individual, or by the opportune arrival of hygienic and therapeutic aid.

In the armies of the United States during the present struggle, the hygienic precautions resorted to have been, as a general rule, it may safely be said, far more complete than has usually been the case in other great armies. Accordingly, as might be expected from this fact, it is, as a rule, only these preliminary scorbutic complications and incipient symptoms that have been observed; and as in our once happy country few opportunities formerly occurred for the physician to become personally acquainted with scurvy, these early stages of the scorbutic disease were not always recognized as such, but were variously interpreted, and assigned to other morbid categories. In fact, there are many surgeons even at the present time who will positively deny that scurvy in any of its stages has existed among our troops to any great extent during the present war.

The author, however, who had, ten years ago, a sufficiently good opportunity of becoming acquainted with scurvy in all its stages in the Philadelphia Almshouse, is well satisfied, from personal observation, that both as a distinct affection in its early stages, and as a complicating influence, affecting the other

camp diseases of the army, scurvy has hitherto played a large part in the phenomena of disease in the Eastern armies, and conversation with many of the leading medical officers of the armies of the West has satisfied him that the phenomena there presented have been in this respect so precisely similar that if his interpretation is correct for these it must apply to those.

The phenomena observed in the simplest cases have been great general debility, with deficient or morbid appetite, impaired digestion, disinclination to exertion, and intellectual torpor and apathy, occurring in patients apparently free from any organic disease. Large numbers of such cases have been discharged from the service on surgeons' certificates of disability, no other diagnosis being ventured by the medical officers than the sufficiently vague one of "General Debility."

This debility occurs often in men who have neither been exposed to fatiguing marches nor to over-exertion of any kind, but it is noticed to a much greater degree after extraordinary fatigues and exertions, and may then be confounded with the exhaustion natural under such circumstances. In either case, however, it is accompanied by concomitant affections, which should render the true nature of the disorder clear to the careful observer. A certain peculiar anæmia, accompanied by a muddiness of the complexion, a dullness of the conjunctiva, a smooth, cool, large, and flabby tongue, and by neuralgic pains in various parts of the body, is usually present in the early stages of incipient scurvy. In uncomplicated cases the patient is free from the icteroid hue, bloated

appearance, and enlarged spleen of malarial disease; but the two conditions very often coexist, masking each other to a considerable extent.

In this condition there is more or less tendency to diarrhœa or dysentery, and the debility is often attributed entirely to this symptom, which is in fact one of the most serious of the phenomena of the early stages of scurvy. The affection, whether called by the name of diarrhœa or dysentery, is accompanied by profound structural lesions in the mucous membrane of the colon, thickening, softening, and ulceration, as will be fully detailed in the chapter on Diarrhœa and Dysentery.

Complicating the diarrhœa in many cases, and in many cases also in which no diarrhœa exists, the neuralgic pains may become a prominent symptom. Their most frequent seats are the lumbar region of the spinal column and the legs or feet, but any part of the body may be attacked. These cases are generally reported as lumbago or as chronic rheumatism, and immense numbers of patients suffering from this variety of rheumatism have accumulated in the various hospitals, and finally have been discharged from service. A full account of this form of disease will be found in the chapter on Pseudo-rheumatism.

Various other interesting symptoms may be present. In many cases thoracic neuralgia is a prominent complication, and in a still larger number cardiac palpitations are present to so marked a degree as to lead incautious observers to the idea that the patient is suffering from chronic heart disease; night-blindness has also been observed in a considerable number of cases.

A longing for vegetable food in all its forms accompanies these protean phenomena; the most unwholesome food is devoured with avidity; unripe apples, uncooked ears of corn, and the like, when they come in the way of the troops, are seized upon with eagerness, and as these rash and irregular indulgences are generally followed by diarrhœa, or if diarrhœa already exists, by its aggravation, from the indigestible character of the food, the conclusion has been erroneously arrived at by some that the disorder cannot possibly be scorbutic in its nature, since it is aggravated by vegetable diet.

Such are some of the prominent forms of the mild scorbutic affection as actually observed among our soldiers. In the severer cases the gums are swollen, spongy, and bleed on the slightest touch; this, however, is comparatively rare. The hard swelling about the joints of the lower extremities, the scorbutic petechiæ, and other phenomena of more fully developed scurvy, occasionally occur, but in a small number of cases only, and in these are preceded by the whole train of phenomena of the milder cases.

But besides these simpler cases of scorbutic disease, there can be no doubt that the same tendency has complicated diseases generally throughout the army during the past two years, and has even modified the results of wounds and injuries, interfering with the healing process, and increasing the mortality of traumatic cases of every kind. An attempt will be made hereafter to describe this complicating effect as manifested in the disorders described in most of the subsequent chapters.

With this brief outline of the phenomena, a short

account must here be given of the causes of the scorbutic affections. Scurvy—regarded too generally as a single distinct disease, comparable in unity to small-pox or measles—may be stated to embrace quite a series of morbid conditions, differing considerably in their phenomena, in accordance with the energy and character of the determining causes.

Of the causes most frequently assigned, the most important appear to be errors of diet and cooking, or, as these usually coexist in armies, the leading cause of scurvy may be designated in a single word as *camp diet.* That this is the chief and most important of the determining conditions, is shown by the facility with which the disease disappears under the influence of a suitable regimen when this is available; that it is not the only condition, appears from the effect of other influences in conducing to the same result, as will be presently mentioned. Some of these are *want of exercise* or its converse, *excessive fatigue, cold, moisture, exposure, bad ventilation, dirt,* etc., among the physical conditions; and depressing emotions of every kind, above all *nostalgia,* among the moral influences.

And first, of the influence of *camp diet* in the production of scurvy.

When scurvy first attracted scientific observation and became the object of sanitary science, it was noticed chiefly among those, especially sailors, whose diet consisted largely of salt meat. Hence arose the idea still entertained by some that the use of salt meat was the cause of scurvy. It has been found, however, that scurvy may arise among those who are fed exclusively on fresh meat, and the first narrow

notion of the causation of scorbutic affections is now no longer tenable. More recent writers on the subject therefore connect scurvy less with salt provisions than with the absence of a sufficient quantity of fresh vegetable food, observation having shown that the disease seldom or never makes its appearance except when the supply of fresh vegetables is deficient, and experience proving that of all the various methods of treating scurvy a liberal supply of fresh vegetable food is the most efficient remedy. Attention has lately been called, especially in the splendid volumes devoted to the Medical and Surgical History of the British Army in the Crimean War, to *sameness of diet* as a cause of scurvy. To sameness of diet, imperfect cooking, such as unfortunately is too generally met with in camps, may be added as a co-operating influence.

The space allotted in this work to preliminary observation will not permit a full discussion of the various theories of the etiology of scurvy which have been propounded. They are, as would be expected, as numerous as the varied individual experience of writers. In the opinion of the author, dietic errors alone are capable of producing this disease—all the other influences, which will hereafter be considered, being merely co-operating agencies, which may modify the gravity of the affection, but which alone cannot produce it. Of dietic errors, while sameness of food, imperfect cooking, and excess of salt provisions are all aggravating conditions, the absence of fresh vegetable food appears to be the determining cause.

This etiological question is not merely one of scientific importance: it is of grave practical significance.

The weight attached to certain hygienic precautions hinges entirely upon the theoretic views adopted. It is, therefore, of importance to set forth some of the chief facts which lead to the foregoing conclusion.

And first, while all the other conditions which have been assigned as the cause of scurvy are variable, and may or may not be present in any given instance, a deficiency of the vegetable element of the diet is a constant and invariable concomitant of all the outbreaks of scurvy which have hitherto been recorded. There is probably no single instance of scurvy making its appearance among any body of troops who were duly supplied with an abundance of fresh vegetables in addition to their fresh meat.

Conversely, when scurvy has made its appearance, while potash salts, chalybeates, lime-juice, and other antiscorbutics may act as powerful palliatives, moderating the violence of the symptoms and assisting the constitutional resisting powers of the patients, these measures are never completely and permanently successful unless associated with a free supply of fresh vegetables as an addition to the diet, and this diet alone, without the use of antiscorbutic medicaments, is sufficient to eradicate the disease.

It is true that many instances have been recorded in which the appearance of scurvy among troops has been attributed exclusively to cold, moisture, bad air, and the like. In such memoirs the proportion of vegetables actually furnished to the troops is either passed by in perfect silence, or alluded to in the briefest and most unsatisfactory manner. Such statements, therefore, however prominent they may make the influence of the various co-operating causes, do not

militate in the least with the views here advanced. Certainly, in the armies of the United States during the present war, the ration as actually furnished to the troops in the field is such that the appearance of scurvy to the degree described in the early part of this section is by no means in conflict with the theory here advanced.

It is true that, by the act of Congress improving the ration during the present rebellion, it is ordered that one pound of potatoes per man shall be issued at least three times a week if practicable; but difficulty of transportation and many other causes, some of them perhaps unavoidable, have interfered with the complete execution of this wise provision. It may be unhesitatingly affirmed that the issue of potatoes has hitherto as a general rule been rare and incomplete, not only with troops on the march and in remote posts, but in the great encampments of the largest armies, even when so situated that want of transportation was no available excuse.

The potatoes thus imperfectly supplied are the only fresh vegetables directed by law to be furnished to the troops, and although the commissary department has availed itself of the general provision, which authorizes that the equivalent of any of the ingredients of the ration may for convenience or necessity be substituted, and furnished *onions* occasionally instead of potatoes, yet the issue of onions has been still more limited than that of potatoes.

Desiccated vegetables, it is true, have generally been available and furnished in sufficient quantities; but at the best these are only an imperfect substitute for the fresh articles, and a want of care in cooking

them has caused them to be regarded with dislike by the men, who often neglect to use them when furnished, so that even the benefit which they are capable of producing has not been enjoyed.

It is true that the liberal pay of the American soldier enables him to procure of the sutlers many articles not furnished in the ration; fish, apples, potatoes, onions, sour-crout, and pickles are among the items thus supplied. During the summer season, fruit, ripe and unripe, is occasionally afforded by accidental circumstances in considerable quantity. The author has seen a whole regiment at a halt, break ranks for a turnip field, and devour the succulent roots raw; green ears of corn have also been treated in the same way in passing near corn fields; but the vegetable food obtained in this incidental manner has on the whole been insignificant in quantity when compared with the actual demand.

The general criticism, then, which may be made upon the ration of the American soldier, is that, as practically issued, it is deficient in fresh vegetables, and that in view of this deficiency it is not surprising that a certain amount of slight scorbutic disease exists among our troops. That it has not done so to a greater extent is due to the liberal character of the ration in other respects, especially in the allowance of fresh meat, which has been freely used,—cattle being driven with our armies in all their large movements. In fact, while criticising what he believes to be the chief deficiency of our ration, the author is freely willing to acknowledge it to be in many respects the most liberal and best constituted army ration in the world. The full allowance of meat and of bread is

even perhaps too liberal, and might be economized to advantage for the purpose of supplying vegetables. This point is insisted upon because it is believed that the surgeons of regiments in the field, with the co-operation of the line officers, can do much to effect an improvement in this respect, and to prevent the outbreak of scorbutic affections, even under existing laws, and without any alteration in the present ration. It is well understood that when a company does not draw its full ration, the value of the balance retained by the commissary is credited as the company fund, and may be expended for the benefit of the company by the company council. If the surgeon can, by representing the importance of the measure, succeed in inducing the company council to expend this fund mainly in the purchase of fresh vegetables, more real benefit will result than would follow any other mode of disposing of it. No company in which the account with the commissary is accurately kept need be without a fund sufficiently large to supply these important articles of diet to a very great extent. This system has been adopted by a number of the regiments now in the field, and it would appear that these regiments have escaped from the scorbutic symptoms above described to a remarkable degree; surgeons are, therefore, earnestly urged to do all in their power to call the attention of company and regimental officers to the importance of this subject.

Onions, turnips, carrots, and white or sweet potatoes may be mentioned as among the most desirable vegetables for this purpose. Sour-crout is also

useful when the men relish it, as is especially the case with German troops.

Onions may be particularly mentioned, in this connection, with the highest approbation. They are not bulky, go a great way in proportion to their weight, and are generally liked by the men; they give a relish to the meat and tempt the appetite.

Reference may here be made to the doctrine that fresh meat is in itself alone a preventive and cure of scurvy, a view strongly advocated by some, and among others by the two distinguished American Arctic travelers, Kane and Hayes. The experience of the United States army on the frontier does not corroborate this doctrine, scurvy having been there frequently noticed among troops well supplied with fresh meat, but deficient in their supply of vegetables; and as has been already stated, the liberal manner in which fresh meat has been supplied to the troops during the present war has not prevented the existence of wide-spread scorbutic complications. Perhaps the quality of the meat has something to do with the contradictory experience on this head, and the flesh of cattle over driven or ill fed, as those accompanying troops on the march must necessarily be, may be less efficient in aiding to counteract the scorbutic tendency than that of cattle in better condition.* Wild meat on the frontier appears a preventive.

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* It may be of some interest to mention here, that the above views of the essential cause of scurvy, and of the means of preventing and curing it, agree fully with the general experience of those medical officers of the United States army who have had the best opportuntity of observing the disease on frontier posts. Refer-

After these general remarks on the influence of diet, the co-operating conditions which concur in the production of scurvy may be next briefly presented.

Want of exercise, or its opposite, *excessive fatigue*, are powerful co-operating conditions in the production of scurvy. Patients attacked by the disease exhibit from an early period an indisposition to exertion, which, if indulged, favors the progress of the affection, while moderate exercise has been found an efficient adjuvant to other measures in combating it. On the other hand, the excessive fatigue which military necessity at times imposes upon armies, has been followed, when the dietetic influences above described have been present, by violent outbreaks of scurvy, and in such cases *rest* has been found an important aid to a judicious application of dietic measures.

Cold and moisture have been insisted upon by some writers, and there can be no doubt that exposure to the cold rains of fall, winter, and early spring may co-operate in giving severity to the disease.

The same may be said of *bad ventilation and of dirt.* There can be no doubt that when scurvy appears among troops crowded together in filthy and ill-ventilated quarters, it manifests itself with peculiar severity.

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ence may be made especially to the experience of Assistant Surgeon G. Perin, in 1851, with the expressed juice of the agave americana; of Assistant Surgeon S. W. Crawford, 1853, with lamb lettuce and poke-weed (fedia radiata and phytolacca decandra); to the interesting papers of Assistant Surgeon E. W. Johns, 1858–9; and to many short allusions by various medical officers, through the published volumes of the Statistics of the United States Army.

Nostalgia and *depressing* emotions of every kind may also aid in the development of the disorder, and by some even at the present day are regarded as its only causes.

There can be little doubt that each of the conditions thus briefly enumerated may exert a potent influence on the severity and extent of the disease; but it is not probable that any of them or all combined are able to produce it when the diet is abundant, varied, and contains as a constituent part a fair share of fresh succulent vegetables. The effect of these accessory influences may, in fact, briefly be expressed by saying that *depressing influences* of every kind hasten the development of the disorder among those who are exposed to it by the nature of their food, while by scrupulous care in avoiding such influences the injurious effects of imperfect diet may be more or less retarded and diminished in intensity.

To preserve the troops under his charge from scurvy, the medical officer has, therefore, two duties to perform: on the one hand, to use his utmost endeavors to make their diet as complete as possible, especially, if within his power, to cause them to be supplied with a due proportion of fresh meat and fresh vegetables; and, on the other hand, to attend to their general hygienic condition, enforcing, as far as possible, cleanliness, ventilation, and proper shelter; giving his best advice and expending his best exertions to surround them by those normal sanitary conditions, a neglect of which is sure to be followed by the outbreak of disease in some form, and certainly aggravates scorbutic affections as well as every other form of zymotic disease.

In the foregoing pages scurvy has been regarded from the purely practical stand-point of symptoms and causation. If the views above expressed as to its etiology be accepted, the treatment as well as the prevention becomes obvious.

All speculations as to the pathology of the disorder will here be passed over for want of space; besides, the notions of the pathological anatomists and chemists are not yet based upon sufficient data to make it important to enter into their general discussion in so small a volume as this. One view as to the nature of the affection has, however, been so largely received that it cannot be entirely overlooked.

Dr. Garrod having ascertained by analysis a deficiency of potash salts in the blood and urine of a patient laboring under scurvy, suggested the idea that the whole train of morbid phenomena might be attributed to this deficiency, stating as corroborating circumstances that an analysis of the diet which has been found most conducive of scurvy, shows it to be deficient in potash salts, and that fresh vegetables, and especially potatoes, which are so successfully employed in treatment, contain these salts in large quantities.

On the strength of these facts, it has been largely believed that the absence of the potash salts is the essential pathological condition in scurvy, and that the administration of these salts may be advantageously substituted for fresh vegetables in the treatment.

Dr. Garrod's observation of the deficiency of the potash salts in scurvy has been corroborated by

several observers, among others by Surgeon-General W. A. Hammond, who states in a paper written for the Sanitary Commission, in 1862,* that he has observed, in several analyses of the blood of patients affected with scurvy, that "the amount of inorganic constituents is very materially lessened, principally through the diminution in the quantity of *potash*, *lime*, and *iron* normally present in the blood."

These observations, however, are as yet too few, and the accessory deviations in the quantity of albumen, corpuscles, and other ingredients of the blood in the same cases are too notable, to permit us to regard the potash doctrine of Garrod as anything more than a speculation. General Hammond, in the paper referred to, goes further than this, and says, in speaking of Garrod's views, "we confess to having once held a similar opinion, but more extensive observation has satisfied us of its incorrectness."

In fact, when the therapeutic doctrine which flows out of Garrod's pathological views is subjected to the test of experience, it is found that while the salts of potash on the one hand, and the salts of iron on the other, appear to act as important palliatives in some cases, they fail in others altogether, and that neither of them are ultimately available to effect a cure if the dietetic conditions in which the disease originated remain unchanged; while if it is possible to obtain fresh succulent vegetable food in abundance, the patients rapidly recover without any medicinal interference.

The general principles which should guide the

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* Sanitary Commission. Document N. 1862.

treatment of simple scorbutic affections are sufficiently obvious from the foregoing remarks, and need not here be enlarged upon; and as the various complications of a subacute scorbutic condition with other diseases will be the subject of frequent remark in the following pages, the treatment appropriate to such mixed cases may be conveniently postponed for the present.

CHAPTER III.

CAMP FEVERS.

UNDER the designation of *camp fevers* may be included all the continued fevers occurring in the army. Passing by *typhus fever*, which has been the scourge of European armies, and *yellow fever*, which is the peculiar epidemic of the Gulf coast, neither of which has, however, prevailed to any extent during the present war, these fevers may be divided into three principal groups: *typhoid fever*, with or without scorbutic complications; *malarial remittent fever*, with or without scorbutic complications; and a vast group of mixed cases, in which the malarial and typhoid elements are variously combined with each other and with the scorbutic taint, and for which the author proposed the name of *typho-malarial fever*, which was adopted by the army board before alluded to as having prepared the statistical form of sick report at present in use in the army.

Typho-malarial fever is the characteristic camp fever of the army at the present time, and has been so since the commencement of the war. Cases of ordinary typhoid fever unattended with malarial phenomena do undoubtedly occur. Much more frequent are malarial fevers, which in their course assume a continued form without presenting the abdominal symptoms of true typhoid disease, and without exhibiting in fatal

cases the characteristic intestinal lesion; but in the great majority of cases the well-marked enteric symptoms are complicated by malarial and scorbutic phenomena, which produce decided modifications in the course of the disease, and in the mode of convalescence which follows it, and which require a treatment modified in accordance with the individual conditions of each case.

The general cause of camp fever, including under this head all the idiopathic continued fevers, is well illustrated in the following table—prepared by the author for a recent circular of the Surgeon-General's office—which exhibits the monthly ratio of cases per thousand of mean strength, for the year ending June 30, 1862.

In this table the rates for the troops serving on the Atlantic border are contrasted with those of the armies operating in the central region, between the Appalachians and the Rocky Mountains, and those of the troops on the Pacific coast. It will be seen that on the Pacific coast, where the conditions closely resemble those of times of peace, the proportion of cases is nearly four times less than on the Atlantic border, and more than five times less than in the middle region. It will also be observed that the autumnal character of the camp fevers of our army is quite as strongly marked in this table as in the case of intermittent fevers, as shown in the table in Chapter IV.

Monthly Rates of Camp Fever in the Armies of the United States during the year ending June 30th, 1862, expressed in ratio per thousand of mean strength.

1861.

	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Atlantic border.....	8·30	18·78	25·60	27·64	27·88	19·74
Central region	15·94	34·07	38·06	36·57	35·38	26·00
Pacific border.....	1·45	6·28	1·97	9·73	5·31	7·43

1862.

	Jan.	Feb.	March.	April.	May.	June.	For the year.
Atlantic border.	13·85	13·81	10·99	17·42	24·88	27·07	238·99
Central region..	21·98	18·15	16·46	23·71	29·39	27·64	319·94
Pacific border...	3·78	5·00	5·15	3·28	5·52	1·78	60·95

SECTION I.

Typho-Malarial Fever.

Symptoms and Course of the Disease.—From the complicated nature just indicated it will of course be readily understood that it is not possible to present a typical picture which shall be even approximately true of all cases. Great variations exist in accordance with the predominance of one or another of the etiological conditions above pointed out. In consequence of these variations the cases may be best grouped for descriptive purposes into at least three different varieties:—

1. Fevers in which the malarial element—without being the only pathological condition present—is the predominant one.

2. Fevers in which the typhoid element is evidently predominant, although the others are also present in a more or less distinct manner.

3. Fevers of either of the above classes in which, either from the first or at some time during the progress of the affection, the scorbutic element becomes predominant.

These varieties, however, are not sharply defined, but pass into each other by the most insensible gradations, and cases belonging to any of them may be yet further complicated by the occurrence of various intercurrent phlegmasiæ; and the predominance of one or another of the leading trains of symptoms giving rise to one or another of these varieties of the disease does not occur accidentally, but in a certain definite

accordance with well-defined conditions, as will be seen in the sequel.

The first class of cases is, on the whole, the most common, and will first receive attention.

Typho-Malarial Cases in which the Malarial Phenomena predominate.—These cases generally begin with a more or less decided chill followed by fever. Premonitory symptoms are often altogether absent, the patient is suddenly attacked after some night exposure, as on picket duty or on march, especially in wet weather and in a malarial region. In other cases, malaise, wandering pains in the back and limbs, persistent frontal headache, an icteroid countenance, loss of appetite, general exhaustion, and depression of spirits, with or without accompanying diarrhœa, may precede the attack.

The chill is of variable duration—usually, however, less than an hour in length—like that of an ordinary intermittent or remittent, which it closely resembles, and is followed by decided febrile reaction, with hot skin, full, moderately accelerated pulse, loss of appetite, diminished secretions, and sometimes with delirium, or at least mental confusion. The fever pursues a variable course, which closely resembles that of common remittent fever. The type is most frequently quotidian or tertian, with febrile paroxysms, more or less distinctly marked in the afternoons, daily or every other day. The remissions, although less decided than in the remittents usually seen in the Middle States, are yet perhaps not less so than in the severer forms of remittent fever endemic in the latitudes in which the Federal troops have been

chiefly operating. These early stages of the disease, moreover, are frequently accompanied by the icteroid hue, the gastric tenderness, the nausea and vomiting of remittent fever. Nor, although the tendency of the fever to assume a continued form in a comparatively early period of its course is a prominent point in its history, can this be insisted on as a peculiarity, for the same fact has long been well known in the endemic remittents of the Southern United States.

Even at the commencement of the disease, however, a symptom often exists which should direct attention to the probable nature of the case. This is the existence of abdominal tenderness wholly independent of any gastric disorder which may exist. The point of tenderness is most frequently the right iliac region; sometimes, however, the umbilical region, or the general surface of the abdomen.

Careful pressure in the right iliac region will often determine the gurgling sound so frequent in enteric fever. This characteristic abdominal condition may be accompanied by diarrhœa, and especially in those cases in which diarrhœa has preceded the development of the febrile condition. Very often, however, there exists at this stage of the disease not only no diarrhœa, but actual, and sometimes even obstinate, constipation.

The tongue also during this early period, and often from the very first, presents notable peculiarities. Although in some cases furred in the usual manner of remittents with a white or yellowish coat, in very many instances it presents a special aspect. It is large, and indented on the edges by the teeth; is flabby and pale; the surface smooth; the papillæ

hardly noticeable, and covered with a white fur, which is thickest on the edges. This is especially the case in patients in whom the scorbutic disposition exists. In other cases the whitish or yellowish-white coat, moderately thick on each side of the median line, is thinner toward the middle, tips, and edges, with single enlarged papillæ projecting as conical red elevations through the fur.

If the disease is not checked by remedies, very frequently, in spite of treatment, a train of symptoms, closely resembling the corresponding stages of enteric fever, sets in toward the latter part of the first or the beginning of the second week. The pulse becomes more frequent and feeble, the patient emaciates greatly, the disinclination for food amounts to loathing, the prostration is extreme, the tongue becomes brownish and dry, often fissured with deep gashes. Low delirium makes its appearance, with dullness of hearing, restlessness, subsultus tendinum, picking at the bedclothes, and other evidences of cerebral disturbance; at the same time the abdominal symptoms become more decided, and diarrhœa, if not previously present, now usually appears. The *tache rouge*—regarded by many as diagnostic of enteric fever—sudamina, and tympanites may be present during this stage, but are often entirely wanting. The subsequent phenomena vary in accordance with the intensity of the disease, the resisting power of the patient, and the success of the hygienic and therapeutic measures adopted to combat it. In fatal cases the symptoms are usually quite like those of fatal enteric fever; the prostration becomes more and more complete, the pulse extremely frequent, often 130 to 140 or more,

feeble and fluttering; sordes collect about the gums and teeth; the cerebral disturbances described pass gradually into stupor and coma, involuntary evacuations take place, the countenance becomes hippocratic, and the patient expires. Death takes place perhaps most frequently toward the close of the second week, though it may occur earlier or later. In more favorable cases an amendment of the symptoms occurs some time between the tenth and twentieth day. The tongue begins to clean, the abdominal disorder subsides, with the exception usually of the diarrhœa, which is more persistent, the pulse becomes slower and fuller, the cerebral and nervous disturbance gradually disappears, the appetite returns, and the patient enters upon a slow and tedious convalescence, in which muscular debility, more or less diarrhœa, mental torpor, cardiac irritability, and other characteristic symptoms continue long after the emaciation produced by the disease has completely disappeared. Sometimes the progress of the convalescence is diversified by the occurrence of the chills of ordinary intermittent fever.

The train of phenomena thus briefly sketched may be modified or complicated by the occurrence of some intercurrent inflammation. Bronchitis, as in ordinary typhoid fever, is one of the most frequent of these, but pneumonia and cerebral inflammation are also common. Suppurative inflammation, of one or both parotids, has also been a frequent and annoying complication of the disease. The occasional occurrence of peritonitis in the course of the convalescence is usually associated with intestinal perforation.

It will be seen that the affection thus sketched, while in its early stages closely resembling ordinary

remittent, in its latter stages resembles enteric fever, and this not merely in the presence of adynamic (typhous) symptoms, as in simple remittents, but in the presence of all the indications of the intestinal lesion of enteric fever, due, as will be seen hereafter, to the actual and characteristic changes in the glands of Peyer, the solitary follicles, and the mesenteric glands.

Cases of Typho-Malarial Fever in which the Typhoid Phenomena predominate.—The second group of cases begin insidiously like enteric fever. The patient has frequently been failing for weeks before he gives way and is relieved from duty. The premonitory symptoms are in the main those of enteric fever; lassitude, debility, indisposition to exertion, frontal headache, pains in the back and limbs, and slight febrile reaction toward night are the leading phenomena, which gradually augment until the patient is entirely unfit for duty and takes to his bed. Diarrhœa is generally present from an early period; sometimes even it will be found that a persistent diarrhœa has long preceded the occurrence of the febrile phenomena. Epistaxis occasionally occurs, but much less uniformly than in the enteric fever of civil life. In the early stages the tongue is usually moist and presents the characters described in connection with the last variety of the disease; the pulse slightly accelerated, with a febrile reaction in the course of the afternoon and night, during which there is more or less mental aberration. The countenance becomes dusky and suffused, the blood returning slowly to the capillary vessels in the face after they have been emptied at any

point by the pressure of the finger. In the course of the second week severe typhous symptoms set in and the disease runs the same course as that of the variety first described.

This form of typho-malarial fever approximates the enteric fever of civil life much more closely than either of the other varieties; nevertheless, in its incipiency, during its progress, and in the course of convalescence, various peculiarities occur which fully justify the epithet typho-malarial.

Prominent among these peculiarities, the existence of a marked tendency to *periodicity* may be mentioned. It is well known that in ordinary enteric fever there are usually slight remissions in the forenoon, with exacerbations in the afternoon and at night; but in the cases under consideration this condition is present in a marked degree. Moreover, very frequently the exacerbations are particularly marked every other day, giving the disease a decided tertian type, which is apparent even to a superficial observer. The occurrence of hepatic tenderness, with an *icteroid hue* of the countenance, is also a frequent concomitant of the disease, and especially of its earlier stages. *Enlargement of the spleen*, readily detected by percussion, frequently exists, the enlargement being usually greater than is ordinarily observed in enteric fever. The *peculiar character of the convalescence* already briefly described, and which will be dwelt upon hereafter, is also a matter of diagnostic importance.

Cases of Typho-Malarial Fever in which the Scorbutic Element is the prominent Phenomenon.—In this class of cases, the general course of the disease is usually quite

similar in its outline to those last described, the disorder commencing insidiously and gradually assuming the typhoid character some time in the course of the second week; but in addition to the malarial phenomena described in the last variety, and sometimes quite masking them, a train of decidedly scorbutic symptoms is present, with more or less intensity, from an early period. The patient generally shows evidences of a scorbutic tendency for some time before the fever sets in. Muscular debility, mental depression, deficient judgment, impaired memory, indisposition to exertion, want of courage for the present or hope in the future, despondency, tending toward indifference, manifesting itself in slovenly carelessness of the person, and neglect of cleanliness, are characteristic conditions. The skin becomes opaque and of a light clay color, sometimes covered with a furfuraceous bran of desquamating epithelium; the tongue broad, moist, smooth, and inclined to be tremulous; the heart excessively irritable, and excited to violent palpitations by the slightest exertion. Frequently neuralgic pains in various parts of the body, but especially in the back and limbs, are a prominent symptom.

The appetite is sometimes deficient, always capricious; fresh vegetables in any form, too often in the shape of unripe and uncooked fruit, are seized upon with avidity, and in the weak state of the digestive organs aggravate the diarrhœa which already exists. Diarrhœa is generally present, often for weeks before the fever sets in; the stools are liquid, even if not frequent. The gums are often unhealthy, sometimes bluish or livid, sometimes swollen and spongy, sometimes separated from the necks of the teeth by

an unusual accumulation of tartar, sometimes bleeding on slight pressure. Epistaxis is more frequent in this variety than in the others, and is often obstinate. When at last the febrile symptoms set in, they often show a decidedly remittent tendency, which more frequently assumes the quotidian, though sometimes the tertian type. The fever is of a low character from the beginning. During the first week there is comparatively little heat of skin; the pulse, however, is frequent, irritable, and feeble. When the typhoid symptoms set in, usually in the course of the second week, the tache rouge and the tympanites of enteric fever are but seldom present; the delirium is generally very quiet, accompanied by much drowsiness, which in many cases amounts to stupor; the tongue becomes dry and cracked, and a hemorrhagic tendency manifests itself in many cases. Hemorrhages take place from the cracked fissures of the tongue, from the lips and gums, or from the bowels. Livid petechial blotches, similar to those of purpura, and large discolorations, resembling the various stages of ecchymoses, not unfrequently occur in various parts of the body; and this, in cases in which the cerebral symptoms are marked, has frequently led the attending surgeons to regard them as true typhus fever. The author is satisfied, from his own personal observations, that a great number of the cases reported as typhus fever in the monthly sick reports are of this character.

In camps and in camp hospitals a large proportion of this class of cases proves fatal. But under favorable circumstances, especially where proper dietetic measures are resorted to, very many recover.

In fatal cases death sometimes takes place from hemorrhage, but very often the patient sinks in the usual manner, and the fatal issue takes place as in the foregoing varieties. In favorable cases the patient usually begins to amend in the course of the third or fourth week of the fever, but the convalescence is slow and tedious in the extreme. A troublesome diarrhœa is frequently left behind, which often proves intractable, and leads ultimately, at a variable period, to a fatal result.

Purpura-like spots or bruise-like discolorations, with or without a relapse into the febrile condition, not unfrequently make their appearance in the course of the convalescence, especially in patients who have escaped them in the earlier stage of the disease.

Such are the chief varieties of typho-malarial fever which have been observed by the author; other modifications have been brought to his knowledge, and some of them are sufficiently noteworthy to be briefly referred to hereafter. These prominent groups are not, however, sharply separated from each other; on the contrary, the most gradual transition forms exist, and there are many cases in which it would be difficult to affirm whether the malarial, the typhoid, or the scorbutic symptoms were the prominent feature.

It may also be observed that between these several groups of cases a certain unity exists, a unity of physiognomy, a similarity of general appearance, which has its basis, as we shall see hereafter, in a certain unity of the pathological conditions present, but which, on mere external observation, is quite as apparent to the careful investigator as the diversity of detail which complicates without destroying it.

This general unity, which is implied by the generic term typho-malarial, as applied to the greater number of the cases of *camp fever* hitherto observed in our armies, is of such a character that, after the foregoing brief outline of the prominent varieties of the disorder, the detailed discussion of symptoms will be most satisfactorily effected by regarding the disease in a generic manner.

In all the cases of typho-malarial fever, it will be understood, from what has preceded, three several trains of phenomena are to be noted: the malarial, the typhoid, and the scorbutic. And the preponderance of one or another of these in any individual case is a subject demanding the most careful observation, as the treatment must receive corresponding modifications.

The *malarial phenomena* may be briefly enumerated as the tendency to periodicity—more or less manifested at some portion of the history of the case—the icteroid hue, the enlarged spleen, the tender liver, and the gastric disturbance.

The *typhoid phenomena* are seen not merely in the presence of an adynamic train of symptoms in the course of the fever, but in the definite period in which they set in, and in the presence of the well-marked abdominal conditions of enteric fever.

The *scorbutic phenomena* are to be recognized in the peculiar mental and bodily prostration which precedes and follows the disease—the remarkable irritability of the heart, the state of the gums, the tendency to hemorrhage, discolorations, and petechiæ, and the extremely protracted convalescence. The peculiar pallid, large, smooth tongue, which is to be seen in

certain forms of camp diarrhœa, as will hereafter be shown, is also connected with the scorbutic condition.

Certain definite and readily recognizable conditions attend the predominance of one or another of these trains of phenomena in the typho-malarial cases of our army. Thus the malarial phenomena predominate in the latter part of the summer and fall, and especially in well-marked malarial regions; the typhoid phenomena, during the winter and spring, and under those depressing hygienic conditions which are known to favor the development of enteric fever; the scorbutic symptoms predominate in troops far removed from the base of operations, whose supply of vegetables is cut off, and their diet interfered with as to quantity, quality, and regularity, in consequence of the difficulties of transportation. The varied preponderance of these determining conditions have produced in the past, and probably will produce in the future, various quite characteristic groupings of the phenomena described, without, however, as a general rule, introducing any new element.

It would be impossible in this connection not to mention, in illustration, the form of fever which occurred in the army of the Potomac during its campaign upon the Peninsula in the summer of 1862, which, under the name of the *Chickahominy fever*, has acquired a sad celebrity throughout the Eastern and Northern States. The author, whose military duty led him with the army of the Potomac during the early portion of that ill-starred campaign, and who afterward at Washington was largely occupied in the preparation of hospital accommodations for the

sick sent back from the army, had the opportunity of seeing a large number of cases of these peninsular fevers in all their stages.

The *Chickahominy* fever was simply a typho-malarial fever, marked by the extreme intensity of all of the three sets of influences above described, with an especial preponderance of the malarial and scorbutic elements. The disease was, therefore, characterized by the suddenness and severity of attack of the malarial variety, with the complications and extremely protracted recovery of the scorbutic cases. The author is informed that a preponderance of the scorbutic symptoms was observed in some of the camps of Western Virginia during the winter of 1861–2, in the great camps before Corinth in the summer of 1862, and in the troops of the New Orleans expedition under General Butler.

This outline of the history of typho-malarial fever paves the way to a more detailed consideration of certain prominent symptoms and complications.

The *pulse* varies considerably in the early stages of the disease. It may be full and moderately accelerated in cases beginning abruptly with a chill, but sooner or later it assumes a characteristic feebleness and frequency. Seldom much above one hundred beats a minute during the first week, it increases to a hundred and ten or a hundred and twenty during the second and third, or may even be more frequent than this in extreme cases. Cases in which it persists above a hundred and thirty for several days generally terminate fatally. Even in those in which the pulse is quite full at the beginning, it is usually compressible, and lacks the firm elastic resistance of the

sthenic fevers of civil life. Sometimes in the severer cases an intermittent pulse is noticed.

The *tongue* in the early stages of the disease is generally coated with a thin whitish or yellowish-white fur. In malarial cases the fur is thicker and of a more decided yellow. A common appearance in this and in the typhoid variety is a whitish or yellowish-white coat, thinner in the middle than on the lateral portions, with red papillæ projecting through, along the middle of the organ.

In the scorbutic variety, the tongue is somewhat swollen, pale, often clammy; indented on the margin by the teeth; the surface extremely smooth, the papillæ scarcely recognizable; often entirely free from coating, or, if a whitish coat exists, it is quite thin, especially in the middle.

When in the course of the second week the typhoid train of symptoms makes its appearance, the character of the tongue changes; it becomes dry and brownish, the thickness of the brown coat varying in accordance with the condition of the organ before it begins to dry. The dry brown coat frequently cracks deeply into the mucous membrane, making ugly raw gashes, from which more or less hemorrhage takes place.

Sordes collect about the teeth, gums, and lips in this condition; sometimes about the orifices of the nostrils.

An improved state of the tongue, manifested by its becoming moist and beginning to clean on the edges, is generally one of the first symptoms of commencing convalescence. One or another of the two well-known modes of cleaning occur, either the tongue cleans gradually from the edges to the center, or the brown

coat is thrown off in flakes from the center and general surface. The latter is the least favorable mode, as in ordinary typhoid fever. In such cases, it is not unfrequent for the red beefy tongue left after the removal of the coat to become dry and even brown once more, with an aggravation of all the symptoms. After the patient has recovered from the fever, it is not uncommon for the tongue to remain more or less unnatural throughout the long convalescence, its most frequent appearance being swollen, pale, and smooth, as in the preliminary stages of the disease.

The *skin* in the preliminary period and in the earlier stages has, in a large number of cases, the peculiar opaque, clay colored, waxen appearance already alluded to, masked at times by the more or less icteroid hue derived from the malarial taint. Its functions are generally irregularly performed. It may be dry and harsh, the surface coated by a bran-like incrustation of desquamated epithelium, or it may be bathed in a clammy sweat, which frequently occurs during the latter part of the night. During the typhoid stage a sluggish congestion of the countenance, especially of the cheeks, is generally present. The peculiar skin of the earlier stages frequently persists throughout the slow and protracted convalescence.

The *secretions* are deficient or suppressed throughout the febrile period, and present the disorders observed in other continued fevers. The urine, generally scanty, is occasionally albuminous, sometimes partially or completely suppressed. The latter condition usually coexists with grave cerebral disorder. The author has recently undertaken some

chemical investigations into the character of the urine in this fever. These are at present far from complete, and it is therefore impossible to present them in detail in this place. The most notable peculiarities thus far observed are the following: in the early stages of the fever the quantity of urine is normal, or but slightly diminished; as the disease progresses, however, it steadily decreases until some time about the close of the third week, when it usually begins to increase, and is gradually restored to the normal standard. The urine, as at first secreted, is generally acid, but speedily passes into alkaline fermentation. The specific gravity, moderate at first, increases as the secretion becomes scanty, seldom, however, exceeding 1025. The quantity of urea excreted daily is at first somewhat above the normal standard, but gradually diminishes, reaching its minimum about the third week, when ordinarily the whole amount excreted does not exceed from four to eight grammes per diem; occasionally the quantity is still less, or the secretion may be altogether deficient. How far the cerebral disturbance, characteristic of the disease, is due to uræmic toxæmia resulting from the retention indicated by the foregoing conditions, is a matter for future consideration. The fixed salts of the urine are considerably diminished, and there is especially a notable diminution in the chlorides, which are often altogether absent, and this in cases in which no chest complications are present. The occasional presence of albumen in the urine has been already alluded to. The stools are liquid, fetid, and dark colored; in the latter stages of the typhoid stage mixed with blood, in which case they are gen-

erally blackish, though sometimes the quantity of admixed blood is sufficient to give them a decidedly reddish tinge.

Critical discharges, in the shape of copious perspiration, urination, or alvine evacuations, sometimes mark the beginning of a favorable change in the course of the disease, but much less frequently than in the continued fevers observed in civil practice. The condition of the hepatic secretion is very variable; at times excessive, as indicated even by bilious vomiting as well as by bilious stools, it is more frequently deficient, as shown by the dirty-clay color of the alvine discharges before the peculiar blackness of the latter stages makes its appearance.

Cerebral and nervous disturbances are prominent phenomena throughout the course of the affection. Most of these conditions have been already noticed. The characteristic mental condition, in the absence of delirium, is the indifferentism, the lack of judgment, the tendency to imbecility, which mark the preliminary stages of the disease, and often persist throughout the convalescence. The *delirium* is seldom violent; generally wandering and muttering. The patient is occasionally inclined to get out of bed and wander away, apparently with some vague purpose; in a word, it presents all the characteristics of the delirium of typhoid disease. *Headache* is generally present at some period during the disease, and especially at its beginning. The persistent frontal headache, which often precedes for some time the febrile stage, has already been noticed.

Jactitation, restlessness, insomnia, or the reverse, hardness of hearing, the peculiar altered voice, exces-

sive drowsiness, subsultus, picking at the bedclothes, in fatal cases slipping down in the bed, are present in the typhoid stage as in the fevers of civil life. Except the characteristic mental debility of the earlier stage and of the convalescence, however, there is, it will be perceived, no peculiarity in these symptoms which would aid in the diagnosis.

The *abdominal symptoms* of the typhoid stage are very variable. *Diarrhœa* is usually present in the cases described above as belonging to the typhoid and scorbutic varieties. In those cases, however, in which the malarial phenomena predominate, the bowels are generally constipated in the earlier stages. With the diarrhœa, *abdominal* tenderness, especially in the right iliac region, and gurgling on pressure at that point usually coexist. The tache rouge and tympanites of enteric fever are very variable phenomena, and are often altogether wanting. In the malarial and scorbutic forms especially these phenomena are frequently altogether absent; indeed, a remarkable flatness or even concavity of the abdomen is often present. In fatal cases it will so generally be found that the abdominal symptoms coexist with some of the various lesions of the solitary and agminated follicles of the ilium that it is fair to presume the same to be the case in those which terminate favorably.

The *duration* of the disease is exceedingly variable. Perhaps, on the whole, it compares most closely with the duration of enteric fever. The most frequent period of death is some time during the second week, but it may occur earlier, or at any subsequent period. In favorable cases improvement is usually manifested in the course of the second or third week, and con-

valescence slowly sets in. A relapse with a fatal termination may take place at almost any period during the convalescence.

The average duration of the disease in the cases which terminate in convalescence may be set down at a little more than four weeks. It varies, however, in the different types of the fever as well as in individual cases. Thus, in the malarial variety above described, the duration is generally shorter, and in the scorbutic variety longer, than the average. The tedious convalescence several times referred to greatly prolongs, however, the length of time before the patient is fit for duty. Three, four, or even six months are common periods to elapse before the patient is restored to the complete health enjoyed before the attack.

Complications and Sequelæ.—Perhaps the most frequent complications of the febrile symptoms above described are visceral inflammations. One of the most usual of these is inflammation of the respiratory organs. The ordinary form is bronchitis, but true pneumonia is sufficiently frequent. The bronchial affection is most severe and pneumonia is most common in the cases which occur during the winter and spring.

Bronchitis is especially apt to be present in those cases which most closely approximate the enteric type, but may occur in any of the forms of the disease. The symptoms are more or less cough and dyspnœa, with clearness or very slight dullness on percussion, and sonorous and sibilant rales in the early stages, replaced by mucous and submucous rales after expectoration is freely established. An intense

capillary bronchitis, with subcrepitant rales and some dullness on percussion over the lower and posterior portion of the chest, is common, and often confounded with pneumonia. The expectorated matters, at first scanty and clear, become subsequently copious, yellowish or greenish yellow, and streaked with blood. In a group of cases which are sufficiently common in the early winter and in the spring, the bronchial symptoms appear very early in the disease, frequently preceding the febrile reaction by some days. In the majority of cases, however, the bronchial affection is not noticed until the fever has fairly set in; in most cases the bronchitis resists treatment during the progress of the fever, and amends as convalescence takes place.

Pneumonia, when it occurs, can usually be distinguished from simple bronchitis by the severer character of the symptoms; the deep-seated dull pain in the chest; the well-marked dyspnœa, and the rusty color which the sputa assume in the course of the affection. But the slighter cases of pneumonia are not so readily diagnosed from the more severe cases of bronchitis, except by careful physical examination, when the crepitant rales of the incipient stages, and the dullness on percussion, and bronchial respiration which accompany hepatization, will at once discriminate. As these respiratory complications do not present any marked peculiarities to distinguish them from the ordinary bronchitis and pneumonia of the army, their further consideration is unnecessary in this place.

Besides the occasional development of intercurrent inflammations of the abdominal viscera, such as gas-

tritis, hepatitis, and splenitis, an important and dangerous complication occurs sometimes in consequence of the intestinal ulceration terminating in *perforation*. The symptoms are those of acute peritonitis; violent abdominal pain; excruciating tenderness on pressure; constipation; tympanites; small, frequent pulse; sunken countenance; collapse and death, sometimes preceded by complete cessation of pain, the result of mortification. The phenomena of this accident are precisely those of the similar condition in enteric fever.

Cerebral meningitis is also occasionally a grave complication; its symptoms are aggravated delirium or stupor, with paralysis, in the form of paraplegia or hemiplegia. Obstinate hiccough, occurring early in the disease, is sometimes noticed in these cases. It is not always possible to discriminate between the cerebral symptoms of the fever and those due to the coexistence of actual meningitis. Cases of adynamic meningitis, moreover, occasionally occur in which the asthenic character of the febrile reaction might well lead the surgeon into errors of diagnosis if the absence of abdominal symptoms were not carefully noted.

Abscesses in various parts of the body, often of considerable size, and *bed-sores* developed at the points subjected to pressure, are of frequent occurrence, and not only prove annoying and troublesome, but considerably augment the danger to life.

Gangrene of the extremities occasionally occurs, especially in the scorbutic variety of the disease, though it may happen in any case in which the patient remains long in a very prostrate condition. The toes are the most frequent points attacked, but the tips of the fingers or the nose may suffer. This condition,

when it occurs in winter, is sometimes confounded with frost-bite. Attention was first drawn to this complication in the army of the Potomac during the winter of 1861–2, but it has subsequently been noticed in all the great armies. The gangrene may progress till it involves the whole foot, or even part of the leg; it usually proves fatal, though cases sometimes happen in which the vital tenacity of the patient enables him to resist this most depressing process—a line of demarkation is formed, and the slough is successfully cast off.

Of the special *sequelæ* of typho-malarial fever, one of the most important is *diarrhœa*, which frequently proves quite intractable, and persists long after the recovery of the patient from the febrile stage of his complaint. This subject will, however, be fully discussed under the head of Camp Diarrhœa.

Another sequela of grave importance and of some frequency is a chronic disease of the kidney with albuminous urine and œdema, which is quite similar to some of the forms of Bright's disease. Albuminous urine is frequently noticed during the progress of the fever itself, and fatal cases of typho-malarial fever often present more or less organic change in the kidneys. Observations are not as yet sufficiently numerous to determine whether this condition of the kidneys—which is also common in the severer forms of camp diarrhœa—originates during the febrile stage, and is connected with it like the similar lesion in scarlatina and diphtheria, or whether it is simply one of the pathological results of the general hygienic conditions to which our soldiers are exposed. Attention is usually first called to the urine by the occur-

rence of œdema of the face and extremities some time during the course of the convalescence. On examination, the urine is found to be more or less decidedly albuminous. The general progress of the affection, so far as yet observed by the author, has been that of Bright's disease; although he is inclined to regard it, from the cases he has seen, as more amenable to treatment than the chronic forms of that disease occurring sporadically, resembling rather in its course the variety of the disorder consecutive upon scarlatina and diphtheria.

Enlargement of the spleen, accompanied by the peculiar anæmia of chronic disease of this organ, is also sufficiently frequent. The patient presents the yellowish, waxen, bloodless hue, the debility and tendency to œdema or ascites which characterize malarial enlargements of this organ. An examination of the blood shows a large increase in the proportional number of white blood corpuscles.

Among the other sequelæ of the affection are deafness, partial paralysis, cardiac irritability—often persisting for months—and muscular and mental debility, continuing even after the patient has regained his usual weight and healthiness of appearance.

The convalescence from typho-malarial fever is usually tedious and protracted, and not unfrequently complications are developed during its course which induce a fatal result long after the patient has begun to congratulate himself on returning health. The hair very generally falls out gradually, and is very slowly reproduced by a new growth.

Post-mortem Appearances.—Numerous post-mortem examinations of patients dying of typho-malarial

fever have been made, more especially in the military hospitals, but also even in the field. The author has had large opportunities both of making and witnessing these examinations, and as Curator of the Medical Department of the Army Medical Museum he has been able to study very numerous specimens, forwarded, with histories of the cases, from all points. These observations coincide in the main with the descriptions contained in many official reports contributed to the Medical History of the War. The latter descriptions he has not felt at liberty to draw upon in this place, and the following remarks will be limited strictly to his own observations with the eye and microscope.

The characteristic lesion observed in fatal cases of typho-malarial fever is a disease of the closed follicles of the small intestine, which, while in its essential nature quite like the similar affection of enteric fever, differs from it in certain points, which must not be overlooked. This morbid condition manifests itself as a gradual enlargement of these follicles, terminating in ulceration. In the text-books at present generally used in this country, this enlargement in the similar lesion of enteric fever is described as due to the deposit of a peculiar morbid material (the typhus substance of Rokitansky) in these glands. The author's personal observations have satisfied him that this is—in typho-malarial fever at least, and probably, therefore, in enteric—an erroneous view of this affection, the true nature of which will be presently referred to.

In the *solitary* follicles of the small intestine the lesion is manifested as a gradual enlargement of these organs, the contents of which become soft, pulpy,

and very frequently blackened from deposits of pigment. All possible stages may be observed, from a barely perceptible enlargement to a little tumor the size of a pea, or even larger, corresponding to the situation of the follicle; the summits of the larger of these tumid follicles are frequently the seat of a small ulcer. Such ulcers are especially to be observed in the ileum, but the enlarged follicles are encountered throughout the whole length of the small intestine. The ulcer, originating thus in a single closed follicle, may remain of small size (one to three lines in diameter), or it may enlarge, invade the surrounding tissues, and produce an ulcer (six lines to an inch, or even more, in diameter) resembling the ulcerations of the patches of Peyer in character, though not in shape or situation.

The agminated glands or patches of Peyer undergo similar changes. As a general rule, every patch is more or less involved, those high in the intestine being least affected, and the tumefaction being most intense toward the lower part of the ileum.

The characteristic ulcer occurring in the patches of Peyer is oval in shape; occupies more or less completely the tumid group of follicles; its edges are jagged and irregular, often undermined. The base of the ulcer is of a dirty-ash color, often with a yellowish tinge, occasionally mottled with dark, blackish points, from the presence of pigment. It may occupy any fraction of the thickness of the mucous membrane. Sometimes it is limited to the follicular apparatus; in its later stages, however, it usually invades, more or less profoundly, the submucous connective tissue, and it may even involve the muscular coat. In the latter event, it sometimes penetrates the muscular layers,

erodes the subperitoneal connective tissue, and, in extreme cases, penetrates the peritoneum, and produces a perforation, through which the intestinal contents may find their way into the general cavity of the abdomen, and give rise to a fatal peritonitis.

In its earlier stages there is little to distinguish this intestinal lesion from the similar process of ordinary enteric fever, except perhaps the great tendency to the deposit of black pigment in the enlarged follicles. In the later stages and more exquisite development of the tumefaction and ulceration, however, certain peculiarities cannot fail to strike the anatomist, which are often sufficiently distinctive to enable him to recognize typho-malarial fever by the post-mortem appearances alone. The tumefaction in typho-malarial fever rises very gradually from the surrounding mucous membrane, and attains a moderate degree of thickness (three to six lines) on the edges of the ulcer. In this it differs materially from the ordinary typhoid ulcer, in which the enlarged patch rises abruptly from the mucous membrane in such a way that the summit is often larger than the constricted base, giving rise to the comparison made by Rokitansky, who likens the shape of the tumefaction to that of flat, sessile fungi. The umbilical depression, so frequent in the ordinary typhoid patches prior to ulceration, has never been observed by the author in typho-malarial fever.

The ulcer itself presents ragged, irregular edges, which are often extensively undermined in consequence of the erosion extending more widely in the submucous connective tissue than in the glandular layer of the mucous membrane. This characteristic

undermining of the edges is much more extensive in these than in ordinary typhous ulcers.

The author has made numerous microscopical examinations of the follicular affection in typho-malarial fever, which will probably be published in detail, with the necessary drawings, in the Medical History of the War. As, notwithstanding the diversities of appearance above noticed, the general characters of the lesion in typho-malarial and in enteric fevers are the same, it is probable that these details apply with but little variation to the latter as well as to the former. A brief outline of them becomes therefore a matter of general interest, and will be submitted in this place.

If one of the solitary follicles, slightly enlarged, be selected for observation, and a perpendicular section of the mucous membrane, extending through the center of the follicle and the whole thickness of the intestine, be carefully made, colored with carmine and treated with acetic acid, the following conditions will readily be made out: the connective tissue cells (connective tissue corpuscles of Virchow), at the distance of a few lines from the enlarged follicle, present a perfectly normal appearance, branched, spindle-shaped, or stellate, and minute, with a single, clear, oval nucleus. As the observer gradually moves the preparation so as to approach the follicles, however, the connective tissue cells are found to be more and more enlarged with turbid contents, with elongating, then with parted nuclei; cells with two, four, or more nuclei are quite frequent in the immediate neighborhood of the follicle. The connective tissue cells of the capsule of the follicle present the same conditions, and the cells of the pulp of the follicle itself are enlarged,

turbid, and contain two or more nuclei. Precisely similar conditions are observed in the same early stage in the agminated follicles (Peyer's patches) and in the submucous connective tissue in which they are imbedded. Simply, the normal structure being in this case more complex the observation is more difficult, unless the anatomist has first familiarized himself with the investigation of the diseased solitary follicles.

In the later stages of the disease of the solitary follicles, the connective tissue cells are observed to be enlarged and binucleated at a still greater distance from the distended follicles. As the follicle is approached, cells with eight, sixteen, or more nuclei are observed; finally, the normal connective tissue cells can no longer be made out, and in their place groups of small rounded or polygonal granular cells are observed. The intercellular fibrous matrix of the submucous connective tissue becomes more and more scanty in proportion as the nucleus multiplication becomes more luxuriant, and finally is represented simply by a granular material, in which the innumerable minute cells are imbedded. Luxuriant cell multiplication has meanwhile progressed in the follicle itself, as well as in the connective tissue cells which surround it; the large multi-nucleated cells of the early stages of the disease are no longer to be found, and in their place innumerable small polygonal or rounded granular cells are seen, quite similar to those above described in the surrounding connective tissue. The outline of the follicle is hence no longer recognizable, and its place is simply marked by a mass of myriads of cells, which are fused in homogeneously with the similar products of the

neighboring connective tissue. In the same stage the patches of Peyer present identical conditions; the several follicles, transformed into a mass of minute granular cells, fused together inextricably with similar cells, the progeny of the interfollicular connective tissue corpuscles, form a homogeneous layer of variable thickness, which passes on the margin by the gradual transitions above described into the normal connective tissue layer.

In this condition it is instructive to cut a thin section perpendicularly through the mucous membrane in the midst of the diseased patch, and move it beneath the microscope in such a way that the muscular layer shall be first observed, and then the several portions successively toward the mucous surface. The connective tissue cells in immediate juxtaposition to the muscular layer will be found normal or but slightly enlarged and granular; but as the morbid mass is approached, the same multiplication of the nuclei, with suppression of the fibrous matrix, as it is gradually encroached upon by the broods of young cells, will be readily observed.

At a later stage in either the solitary or agminated glands ulceration sets in. The granular material, by which the minute cells above described are cemented together, liquefies; the cells themselves become atrophied, irregular, and angular, like the corpuscles of tubercle. A slough-like exfoliation of the mucous membrane immediately over the tumefaction appears to be the beginning of the process of actual ulceration. This is followed by the casting off of the superficial cells, and subsequently by the further liquefaction of

the scanty intercellular adhesive material; the deeper portions undergo the same fate.

From the foregoing descriptions it will readily be understood that, so far as the conditions observed in typho-malarial fever are applicable to the typhous process in general, the idea that the so-called *typhus matter* (the substance of the typhous tumefactions) is a peculiar *exudation* must now be abandoned forever, the cells of the pulpy mass being demonstrably the progeny of the normal elements of the part involved. It will also readily be perceived how it happened that, among the earlier histological observers, some have compared the microscopical elements of the typhous deposit to those of encephaloid cancer, having prominently in view the large multinucleated cells of the early stage, while others have compared them to tubercle, regarding chiefly the minute granular shriveled elements of the last degree of the process.

The *mucous membrane* between the follicles is seldom perfectly healthy even in the earlier stages of the disease; in the latter stages, however, it is usually softened and thickened. Profound congestion is a common accompaniment of the process, and the dark-red hues thus resulting are often replaced by a slate-gray tinge.

As to the essential nature of the softening here remarked, detailed observations are yet desirable. On the whole, the conditions present appear similar to those observed in the softened thickened mucous membrane of the intestines in camp diarrhœa, though generally far less intense. (See Chapter VI.)

Perforation may occur in any of the ulcerations.

Its most common seat, however, is in the lower part of the ileum, where, as above observed, the ulceration is most marked. The size of the aperture may vary from that of a pin's head to three-quarters of an inch in long diameter. A specimen of the latter size is preserved in the Army Medical Museum.

The *peritonitis* which follows this accident is characterized by intense livid congestion of the peritoneal vessels and the production of extensive layers—one to three lines in thickness—of pasty, greenish-yellow inflammatory products (croupous lymph, croupous fibrin, corpuscular lymph). Examined microscopically, this opaque yellow substance is composed of a dimly granular material, without any distinct fibrillization, in which innumerable granular cells, quite similar to the white corpuscles of the blood or to pus corpuscles, are imbedded. This layer readily peels off from the smooth, shining peritoneum beneath it, which is found on examination to be denuded of epithelium.

The transparent fibrinous products and adhesions of sthenic peritonitis have never been observed by the author in these cases, which are to be regarded as exceedingly adynamic in their character.

The *mesenteric glands* are enlarged, softened, and of a livid-purple color on section, frequently stained by deposits of black pigment, the largest glands existing usually in that part of the mesentery which corresponds to the largest ulcers. Microscopical examination shows cell multiplication in every stage in the cells of the parenchyma of the glands.

The *stomach* is generally normal, the mucous membrane occasionally softened, and occasionally also a

few minute ulcers are observed; these lesions, however, are too inconstant to be considered essential.

The same remark applies to the *large intestine*, which in simple cases is generally healthy, but which occasionally presents, especially in the scorbutic variety of the disease, ulceration, softening and thickening, identical in appearance and minute anatomy with the conditions which will hereafter be described as characteristic of camp diarrhœa.

The *liver* is seldom perfectly healthy. Its most frequent condition is some form of what is usually known as the fatty liver. The difference in color between the yellowish and reddish portions of the hepatic parenchyma becomes preternaturally distinct, the yellowish substance appearing in sections to surround the reddish points, thus presenting in a more or less obvious fashion the condition which has been described as nutmeg liver.

In the most exquisite cases the reddish substance becomes pale and hardly observable, and the whole organ, both on its surface and in section, appears of a tawny yellow. The peculiar bronzed color of the liver of remittent fever is also occasionally observed. Microscopical examination shows a considerable quantity of free fat in drops, and occasionally also reddish-brown pigment granules in the cells of the hepatic parenchyma.

The *spleen* is usually enlarged and softened, the cut surface of a livid crimson, almost black. Frequently the malpighian bodies are considerably distended, and present little tumors varying from the size of a pin's head to that of a pea. This enlargement is more constant, and, as a general rule, more intense than the

enlargement of the spleen, which, as is well known, frequently accompanies enteric fever.

The *kidneys* are usually normal in size or but slightly enlarged; their cut surface paler than natural; the epithelium of the urinary tubules unnaturally granular; the cortical portion is slightly enlarged.

The *lungs* present conditions which vary with the degree of chest complication; a certain degree of hypostatic congestion of the lower back portion of the lungs is generally present. In those cases in which bronchitis has existed, injection and softening of the mucous membrane of the bronchial tubes, which are filled with muco-purulent matter, may be observed. A peculiar congested state of the lungs, which are unnaturally friable, and yield an excessive ether extract, though they still float in water, is observed where there has been capillary bronchitis.

In those cases in which pneumonia has existed, the pathological conditions do not differ from those described in Chapter IX.

The *heart* is usually pale, flabby, its fibers granular, if not actually fatty. Clots, the fibrin of which is partially washed free of corpuscles, are frequently found. These, usually more voluminous on the right side, are firmer and more completely washed on the left, where they are frequently in whole or in part greenish yellow, opaque, and granular. They have erroneously been described as cardiac polypi, have been imagined to be vascular, and have even, in certain recent papers in a well-known medical journal, been spoken of as having formed long previous to death, and as causing the fatal result. It appears hardly worth while to combat this extinct error in this place.

The *encephalon* presents little that is remarkable, except in cases complicated with meningitis. Various degrees of abnormal venous congestion are the only condition present with any uniformity. In the intercurrent meningitis referred to, the inflammatory products—which are found sometimes on the surface, sometimes lining the ventricles—present the yellow, opaque, pasty characters of the like products already described in intercurrent peritonitis.

Nature of the Disease.—If, after a consideration of the foregoing details as to the history and pathological anatomy of *typho-malarial fever*, an attempt be made to appreciate these conditions with a view to arrive at the true nature of the disorder, the first question which presents itself is the following: Is typho-malarial fever essentially a *new fever*, or is it simply *enteric* fever, the ordinary febrile affection of temperate climates, presenting a few new and additional phenomena, because occurring in patients whose constitutional conditions are already modified by malarial influences and by the scorbutic taint?

Army surgeons differ in opinion as to how this question should be answered, some unhesitatingly inclining to the first, and others to the second of these possibilities.

Any elaborate discussion of this problem would be quite out of place in a practical treatise like the present. A brief statement of the question alone is admissible.

On the one hand, typho-malarial fever is not to be regarded as a new disease in the ordinary acceptation of the term, that is, as an affection characterized by some new pathological element. Nor, on the other

hand, is it just to look upon it merely as a modified enteric fever, since the malarial and scorbutic phenomena which accompany it are predominant in many cases—perhaps, on the whole, in the greater number. Much rather should it be considered simply as a new hybrid of old and well-known pathological conditions, in which the exact train of symptoms is as variable as the degree of preponderance attained by each of the several concurring elements. And as the general hygienic conditions present in the camps of our armies are, on the whole, similar, this view is quite sufficient to account for the general resemblance existing between all the varieties of the affection, which cannot fail to strike those even who are most alive to their diversity in detail.

The important point here to be insisted upon is not, however, the adoption of one or another of these views. It is practically of little importance which of them the physician accepts, provided he observes the influence of the several hygienic conditions concurring in the production of the disease, learns to recognize the preponderance of one or another of these by the special train of symptoms present in each individual case, and carefully modifies his treatment accordingly. The danger of regarding the affection as a new disease is, that this view is calculated to impel the physician into the search for a new therapeutical remedy. The danger of regarding it as mere enteric fever is, that it would lead to the employment of the unmodified treatment of the latter affection. If, however, the affection be regarded as a mixed one, the practical importance of addressing treatment to all the conditions present becomes at once apparent.

The question of the possible contagiousness of typho-malarial fever need hardly be discussed in this place, after what has been said in the third section of the introductory chapter. It is almost unanimously regarded as non-contagious by those who have had large experience in its management.

Diagnosis.—The only affections with which typho-malarial fever is likely to be confounded are the other adynamic continued fevers, especially typhoid, typhus, and remittent fever. It might seem hardly necessary to add *yellow* fever. Yet so many of the cases which occurred in the army of the Potomac on the Peninsula were reported officially as yellow fever, that a brief outline of the distinctions between these affections appears necessary, especially for the guidance of those physicians who have hitherto had no opportunities of observing true yellow fever.

It will perhaps be convenient to accompany these diagnostic points by a brief synopsis of the symptoms and treatment of the four affections above enumerated, and for this the reader is referred to the second section of this chapter for details, which, to avoid repetition, will be omitted in this place.

Prognosis.—Camp fevers caused about one-third of all the deaths from disease reported in the army during the first year of the present war; nevertheless it has not been nearly so fatal, in proportion to the number of cases, as the camp fevers of the European armies. Of 74,619 cases, 6315 are reported to have died, which would be in the proportion of one death to every 11·8 cases. Compare these figures for a moment with those given by M. Scrive of the camp fevers of the French army in the Crimea, where, out

of 11,124 cases, 6018 deaths are reported, or one death to every two cases. The cases of our camp fevers which assume in their progress a decidedly typhoid character, so as to be ordinarily confounded with typhoid fever, are the most fatal; of the 74,619 cases above mentioned, 21,977 are specified in the reports as "Febris Typhoides," and of these 5608 died, or nearly one in four. Even this, however, falls far short of the French statistics.

The mortality of the fever differs considerably in the various regions of the continent: among the troops on the Atlantic coast the ratio of deaths was 7·19 per thousand cases, or one death in every 13·9; in the great central basin between the Appalachian and Rocky Mountains it was 10·18 per thousand, or one in 9·8; while on the Pacific slope the ratio was but 4·52 per thousand, or one in 22·1. It has been seen already that camp fever is more frequent in the central than on the Atlantic, and more frequent in this than in the Pacific region. It may now be affirmed that the severity and fatality of the disease pursue the same order of intensity.

These figures will prove some guide to the surgeon in anticipating the results of cases. The utmost caution should, however, be used in prognosticating the result in individual instances; the slightest cases occasionally terminate fatally, while on the other hand patients are unexpectedly snatched from the very jaws of death, and recover after all hope has been abandoned.

Treatment.—No detailed plan of treatment can be presented as applicable to all cases of typho-malarial fever. Certain general principles may, however, safely

be laid down, and some of their chief applications pointed out.

The treatment may be divided into two categories—the hygienic and the therapeutic; and of these the former is unquestionably by far the more important, being in itself alone sufficient to restore a large number of the cases. It would be, however, a mistake on this account to despise therapeutic measures, which can very generally in skillful hands be employed with decided advantage, and are often indispensable to save life.

The hygienic measures are threefold, and relate to the three prominent causes already discussed in the introductory chapter: malarial influence, crowd poisoning, and the scorbutic taint. They may be summed up thus: *first*, the selection of a proper *situation* for the hospital; *second*, its due warming, ventilation, and police; *third*, dietic measures adapted to the patient's peculiar condition.

First. Situation of Hospitals.—It will, of course, readily be understood that in this as in all malarial diseases it is very desirable to remove the patient, if possible, from the unhealthy location in which his disorder originated; and as not merely in this fever but in a very large proportion of the other diseases of our army, the malarial influence is a predominant condition, the importance of locating the great general hospitals in sites free from all suspicion of malaria is at once apparent. The happy results of removing the patient, when practicable, to a healthy region have been too generally observed to need to be insisted upon in this place. Unfortunately it is not always possible to put this principle into execution, both be-

cause military reasons frequently interfere, and because, when the disease is fairly under way, and thus positively recognized, it is often no longer safe to move the patient. Much can be done, however, by the regimental surgeon in the selection of a site for his hospital tents, even where, from military reasons, his choice of ground is comparatively limited; glens, low grounds, the neighborhood of marshes and of marshy streams are to be avoided, as far as circumstances permit, an open field, with a dry, porous soil, selected whenever possible, and the tents having been properly pitched, to be deeply trenched around.

Second. Warming, Ventilation, and Police of the Hospital.—No plan of warming hospitals can be regarded as complete which does not involve provisions for due ventilation. Readers are referred to the work on Hygiene, by Surgeon-General William A. Hammond, U. S. A., for a most scientific and complete discussion of this subject. In this place our remarks must necessarily be limited. The mode of ventilation during the summer months, which has been generally adopted in the military hospitals of this country, is by the ridge. An aperture six to ten inches in width, and of the whole length of the building, is left at the apex of the roof; this is covered by a small accessory roof to protect the ward from rain. Small apertures are made at various points in the sides of the ward at or near the level of the floor, to admit fresh air, while the foul and heated air escapes at the open ridge. This simple mode of ventilation is found perfectly satisfactory for summer hospitals. In the winter, however, it is difficult if not impossible to heat wards ventilated in this manner, while snow drifting be-

fore the wind readily finds an entrance at the open ridge, to the discomfort of the occupants. So decided were these difficulties found, that in most of the numerous barrack hospitals of the United States army during the winter of 1862–63 the ridge was boarded up, and as in many cases no substitute was provided, the wards heated with stoves were left at the mercy of such accidental sources of ventilation as the windows and doors, and the crevices which usually exist in temporary wooden buildings. To overcome these difficulties, two plans were proposed and practiced to a certain extent. The most satisfactory method consisted in closing the ridge by shutters swung on hinges, so that the aperture might be closed or opened to any extent at pleasure. The other plan consisted in boarding up the ridge so as to close it completely, and substituting a certain number of shafts, passing through the roof and extending downward to within eight or ten inches of the floor, where they were left open. Each shaft corresponded to one of the stoves used to heat the ward, and the stove-pipe entering the shaft created in it a strong upward current, so that the foul air of the ward, entering at the bottom of the shaft, was carried upward through it. Fresh air was supplied to the ward by openings beneath the stove, which was partly surrounded by a semicircle of sheet-iron. The more complicated methods of heating and warming cannot be discussed in this place; the most desirable plans are those which consist essentially in supplying fresh *warmed* air to the ward, and in removing the foul air by passages terminating in a shaft or chimney, in which an upward current is created by means of heat. The details of

the several ingenious applications of these principles are necessarily omitted in such a treatise as this. The proper method of ventilating and warming *hospital tents* is a subject of great importance in this connection. In the summer time, when no artificial heat is required, this problem is a simple one: it is only necessary to rip several of the seams near the ridge of the tent, making the openings about two feet in length, and propping them open by a stick notched at each end; the tent fly will prevent the rain from entering. Simple as this or some similar arrangement appears, it is too generally neglected, and it has even been asserted by intelligent surgeons that no precautions of the sort are necessary, as ample ventilation would take place in hospital tents through the doors of the tent and *through the canvas.* No greater mistake could be made, and it is sufficient to enter a hospital tent containing six or eight patients, without provision for ventilation, to be satisfied, by the close and disagreeable smell, that some such arrangement as that above indicated is a necessity. In addition to this, the walls of the tent should be looped up every fair day when the weather permits. In cold weather hospital tents may be heated by stoves or by the "California furnace." Stoves for the consumption of wood are most generally employed, though coal stoves are sometimes used, as in some of the tent hospitals near cities. The "California furnace" consists simply of a pit, outside of the tent, for the wood fire; a trench, covered over with sheet-iron or with flat stones, runs from the pit under one or several hospital tents placed in line, and terminates in a chimney outside the last tent. The draught from the fire is

through this trench and chimney. This simple and cheap arrangement has been found adequate to warm three or four hospital tents placed in line; the ground on which the tents are pitched becomes dry and warm, and an agreeable temperature is readily maintained. In either mode of heating hospital tents some provision for ventilation becomes even more imperative than where no artificial heat is employed. The thermometer gives the only certain indications that the proper temperature is maintained, whether in tent, barrack, or permanent hospitals. The temperature most desirable may be indicated at from 60 to 65 degrees. Thermometers for this purpose are now issued, on requisition, to all general hospitals. Where these are not or cannot be obtained, as often in regimental hospitals in the field, the surgeon must judge as well as he can by his own sensations, neither allowing his patients to suffer from the cold, nor producing an atmosphere so warm as to be unpleasant for well persons to remain in. As to the degree of ventilation, a simple criterion will answer almost all practical purposes. The ventilation should be such that a person entering the ward should not ordinarily perceive the slightest close or unpleasant odor.

Intimately allied to the subject of ventilation is that of the allowance of space to each patient. In barrack and permanent hospitals, the arrangements should be such as to allow from 1000 to 1200 cubic feet of air space to each patient in a ward fifteen or sixteen feet in height. The rows of beds should be ten or twelve feet apart, and each bed at least three feet from those next it on either side. In hospital tents of the ordinary pattern, six patients may be

safely accommodated, if measures are taken to secure ventilation, and under the most favorable circumstances good results may even be obtained with eight patients to a tent; but such tents are to be regarded as crowded, and so many patients should never be placed together in a tent except on occasions of emergency. The tents or barracks, however, may not be crowded if each is regarded alone, and yet all the effects of crowding may be produced if they are situated too near each other. In such cases the foul air from each more or less contaminates what should be the pure air supplied to the others. The question of the allowable sick population to a given area hence arises. In a general way it may be stated that this should in no case be permitted to exceed 250 patients per acre of ground occupied.

As to the police of hospitals, whether tents or buildings, scrupulous cleanliness must be absolutely enforced. This must apply to the persons and clothing of patients as well as to the beds and bedclothes, the furniture and utensils, the floors and walls of wards, and the passages, grounds, and surroundings of the whole establishment.

No point requires more care than the removal of the excreta of the sick; urinals, bed-pans, and chamber-pots should be removed from the ward or tent as soon as used, and should under no circumstances be allowed to remain to contaminate the air with their unhealthy emanations. In hospitals furnished with water-closets, these should be maintained in the strictest state of cleanliness, and are to be regarded as either foul or ill constructed if they give rise to any unpleasant odor. In field hospitals, and other situa-

tions, where trench latrines are necessarily resorted to, these should have a layer of fresh earth thrown in daily, and lime or other disinfectants should be used; if this does not suppress all ill odor, the trenches should be closed when about two-thirds filled and new ones dug.

In connection with the subject of ventilation and police, a few words may be said on the general use of disinfectants in military hospitals. Putting aside the question of local disinfectants addressed to foul or gangrenous wounds and ulcers, disinfectants may be used for two purposes—to purify the atmosphere of the wards, and to disinfect cesspools, latrines, and water-closets. For the first purpose, various agents have been employed, which act either by producing an agreeable odor, which conceals the foul emanations of the apartment, or by actually combining with the noxious ingredients of the atmosphere, and producing innoxious compounds. Among the first class may be mentioned the vapors produced by the burning of coffee, sugar, vinegar, or of cascarilla, and other aromatics in the ward; of the second class, probably the most efficacious is chlorine, the means of disengaging which have been placed upon the supply table of the medical department. This excellent disinfectant consists of a mixture of deutoxide of manganese and of common salt, to which sulphuric acid is added, which sets chlorine free, forming a residuum composed of sulphate of soda and sulphate of the protoxide of manganese.

The following directions have been issued from the Surgeon-General's office for preparing this disinfectant. (Circular No 7. May 7, 1863.)

The materials for preparing *chlorinium* are a sulphuric acid mixture and a common salt mixture.

The Sulphuric Acid Mixture.

Take of sulphuric acid s. g. 1·845..... 45 parts.
water..... 21 "

Mix them carefully, and when cold put the mixture into strong bottles with accurately ground stoppers, each bottle to contain sixty-five fluid ounces.

Half a fluid ounce of this to be used for each package of the common salt mixture.

The Common Salt Mixture.

Take of common salt, well dried..... 1800 parts.
binoxide of manganese, containing
72 per cent..... 1875 "

Grind them together into a fine powder, and put the powder up in packages containing about 195 grains each, and put 130 of these packages in a pasteboard box, to accompany the sulphuric acid mixture.

Each of these packages requires half a fluid ounce of the sulphuric acid mixture, and yields about 57 cubic inches of chlorine. This quantity, when thus liberated gradually in a space containing about 20,000 times its volume of air, is borne without inconvenience by persons generally, and is not injurious even in pulmonary diseases. As very much depends upon the ventilation of apartments wherein it is to be used, no absolute rules of application can be laid down, except that it should never be used in such quantities as to produce discomfort or bronchial irritation to patients.

Directions for Use.—One of the above packages or papers of the common salt mixture placed in a saucer or plate, and thoroughly mixed with half a fluid ounce of the sulphuric acid mixture, is to be placed under every alternate bed at night, and allowed to remain there three days. Upon the second night the beds which were omitted the first night should be supplied in the same way, and for the same length of time; and the whole process repeated at the end of three days, or sooner, according to circumstances. Should the wards be badly ventilated or contain many sloughing

wounds, or be subject to epidemic disease or low forms of fever, the process should be continuous—that is, the mixtures should be renewed every third day. Otherwise, once or twice a month may be sufficient. And when thorough cleanliness and ventilation are attained, the process is unnecessary for occupied wards.

In disinfecting unoccupied wards, water-closets, latrines, etc. by chlorine, they should be first cleansed, be closed up as perfectly as practicable, and two packages used for each 600 cubic feet of space.

Bromine has also recently been used in the same manner, and a special influence is claimed for it in cases of erysipelas and hospital gangrene. Small quantities of liquid bromine, allowed to evaporate spontaneously in the wards, will impregnate the atmosphere to any desired extent.

To disinfect cesspools, latrines, etc., various substances may be employed, such as sulphate of iron, solution of chloride of zinc, lime, bleaching powders (chlorinated lime), permanganate of potash, the chlorine powders above described, etc.

Of these various substances the permanganate of potash deserves special commendation, its intense oxidizing power enabling it rapidly to destroy putrid organic compounds. It has recently been placed on the medical supply table of the army, and a circular has been issued from the Surgeon-General's office calling special attention to its value. Used in dilute solution, this salt is not only valuable for disinfecting sinks and cesspools, but may be employed to purify drinking water containing organic impurities, and for many similar purposes.

The several hygienic conditions above sketched cannot be overlooked by the military surgeon in the treatment of any of the zymotic diseases of camps,

except at the peril of his patients. They are of infinitely greater importance than the drugs upon which some seem chiefly to rely. The situation, the ventilation, the warming, and police of the hospitals are, in fact, so many powerful conditions, which may be favorable or unfavorable, may lend all their potent aid to the physician or to the disease; and it may be unhesitatingly asserted that the mortality rates of the fever cases, more perhaps than any other class of diseases, will correspond closely to the intelligence with which these conditions are appreciated and the fidelity with which they are provided for.

Third. Dietetic Measures adapted to Typho-Malarial Fever.—In a disease so manifold in its nature, no fixed diet adapted to all cases can be prescribed. Certain general principles may, however, be laid down, and some of their principal applications indicated.

The diet should be simple and readily digestible, nutritious and supporting, so soon as adynamic symptoms make their appearance; and in all cases the degree in which the scorbutic element is present should be carefully noted, and should be taken into consideration in determining the precise character of the food directed for each individual patient. In those cases in which the febrile reaction is decided, and the pulse full in the early stages of the disease, low diet should be directed; but this is comparatively seldom necessary, the majority of the cases actually encountered demanding a full supply of nutriment from the very first. No greater mistake can be committed than to let the patient run down by delaying the use of nutrients too long. In a certain number of cases, how-

ever, the grade of the febrile action for the first few days is such that a nourishing diet is out of the question, and to attempt to force beef tea upon these patients is apt to increase the fever and produce gastric disturbance.

Under such circumstances the diet should be of the simplest character. Barley-water, rice-water, or toast-water, acidulated with lemon juice, or with citric or tartaric acid, will generally prove acceptable, and may be given as a drink. In these cases the anorexia is often complete, and it is impossible during the first few days to persuade the patient to take any more solid nourishment than such drinks afford. Should he desire it, however, toast and tea, water-gruel, panada sweetened and flavored with lemon-peel or orange, or any similar articles of diet may be furnished in moderate quantities. The patient may generally be allowed to suck oranges when desired, provided he contents himself with the juice and does not swallow the pulp and seeds. Ice in small lumps, and ice-water in moderate quantities, is exceedingly grateful, particularly in summer, and may be employed throughout the whole course of the disease. Even, however, in cases beginning most violently and abruptly, it is not proper to continue this low diet too long; so soon as the pulse begins to become frequent and feeble, and typhoid phenomena make their appearance, a more nutritious diet is required, and very generally this is the case from the time the patient is first seen. As the diseased digestive apparatus is usually unable to manage solid food, liquid preparations are desirable, and the two most generally useful are milk and beef tea. Pure milk cannot

always be managed by the enfeebled stomach at first. In the digestion of milk that fluid is first coagulated and afterward gradually dissolved. In the enfeebled digestion of many fever cases, especially in the early stages, the gastric juice but slowly effects the latter process, and after drinking milk the patient complains of uneasy feelings in the stomach, and often vomits the compressed and but partially digested coagulum. In such cases, whey, especially wine-whey, may advantageously be substituted, the quantity of wine being carefully adjusted to the existing necessity for stimulation. At a later period, in the progress of the case, milk-punch may be given instead.

Beef tea, or some equivalent liquid preparation, has perhaps a wider range of application. Chicken broth, chicken tea, mutton broth or tea, beef tea, and beef essence are the preparations most frequently used, and of these beef tea or beef essence by far most frequently.

Beef tea may be made after the following receipt:—

A pound of lean beef should be cut into small dice, a little salt and a quart of water added; simmer very gently for two hours, then bring to a boil, and remove from the fire; skim off the fat, and give a wineglassful every two hours. Pepper in moderate quantities is not objectionable, if it makes the tea more agreeable to the patient.

Or the following receipt may be used, which is from the "hospital diets" of M. Soyer, and is especially applicable to scorbutic cases:—

Soyer's Receipt for six pints of Beef Tea.

"Cut 3 lbs. of beef into pieces the size of walnuts, and chop up the bones, if any; put it into a convenient sized kettle, with ½ lb. of mixed vegetables, such as onions, leeks, celery, turnips, carrots (or one or two of these if all are not to be obtained), 1 oz. of salt, a little pepper, 1 teaspoonful of sugar, 2 oz. of butter, and half a pint of water. Set it on a sharp fire for ten minutes or a quarter of an hour, stirring now and then with a spoon, till it forms a rather thick gravy at bottom, but not brown; then add 7 pints of hot or cold water, but hot is preferable; when boiling let it simmer gently for an hour; skim off all the fat, strain it through a sieve, and serve."

Beef essence is a much more concentrated preparation; it may be made as follows:—

"Cut 1 pound of lean but tender beef into small dice, and introduce them into a bottle, which is to be corked, and stood in a pot of water; boil for three or four hours; then strain off the liquor by putting the meat, after all that can be is poured off, in a linen bag and expressing. A little pepper and salt may be added."

In the field, and sometimes even in hospitals, it is convenient to substitute for these preparations some form of the concentrated prepared beef extracts, which are now placed upon the medical supply table of the army.

Preserved beef extract is furnished in three forms:

either as a liquid, a jelly, or a solid substance. Of these, the jellies are the most desirable as a general rule, the liquid preparations being liable to spoil, especially in hot weather, and the solid forms of beef stock, and dried beef tea, more or less closely approximating to ordinary glue. The jelly should be preserved, carefully sealed in tin cans; it should be readily soluble in cold water, and of agreeable flavor and odor. For use the requisite quantity of water should be added, and simmered gently for ten or fifteen minutes, until the jelly is completely dissolved.

In the opinion of the author, the nutritive value of the preserved liquid preparations of beef has been greatly overestimated, and, as a consequence, the quantity of water directed in the labels of the manufacturers is much too large.

Of the liquid preparations which have been examined by the author, the most concentrated contained only seventy-nine grains of dry residue to the thousand grains, or a little over six hundred grains to the pound; and it was directed to dilute each pound with the addition of one to four pints of water, which would give, in case the latter quantity was employed, about one hundred and twenty grains of solid dry nutriment to the pint, and this, as a patient can seldom be induced to take more than a pint of beef tea in the twenty-four hours, would represent the whole solid nutriment derived by him from this source. This is entirely too small a quantity of nutriment to meet the indications of fever cases, and such preparations ought not to be diluted in any case with more than at the most an equal weight of water, and if decided effects are required, should be employed undiluted.

The same criticism does not apply to the beef jellies. The most concentrated of these which has been examined by the author yielded on evaporation three hundred and forty-six grains of solid matter to the thousand grains, or nearly six ounces to the pound avoirdupois. A pound of this extract is directed to be dissolved in from four to six quarts of boiling water, which would give to each pint in the first case about three-quarters of an ounce, in the second about half an ounce of dry residue.

If either of these preparations is to be substituted for beef essence, in cases where the prostration is great, and the indications for a supporting and nutritive diet clear, it should be used in a sufficiently concentrated form.

The liquid preparations referred to should be employed undiluted, and jellies, corresponding in strength to that above mentioned, diluted in the proportion of about two quarts of water to the pound of jelly.

Certain general considerations are applicable both to the extemporaneous and the preserved preparations of beef. All these forms of beef tea and beef essence contain the collagenous ingredients of the beef derived from the connective tissue, which holds the muscular fibers together, and the extractives and salines of the muscular juices, but they do not contain dissolved any portion of the substance of the muscular fibers themselves. Musculin is not soluble in boiling water, and the microscope shows the residue of the meat left, after the extraction of beef tea, to be composed almost wholly of the coagulated and undissolved muscular fibers.

The nutritive matters contained in beef tea are,

therefore, not to be compared with those derived, by the healthy individual in the ordinary processes of digestion, from meat roasted or broiled; for in the digestion of meat the muscular fibers are themselves dissolved by the digestive juices. Equally grave would be the error in supposing that because the beef teas contain chiefly the collagenous materials and extractives, they are, therefore, not nutritious; actual experience daily demonstrates that they are, and that their nutritive value is readily regulated by the degree of concentration of the preparation employed: nor is purified glue, calve's-foot jelly, or any similar preparation of gelatine in any way to be regarded as an equivalent substitute for properly made beef tea; the extract obtained at a moderate temperature from good fresh beef flesh is more soluble in cold water, more agreeable in flavor, and certainly more digestible, and of greater nutritive value, than the gelatine obtained from bones, skin, or tendons.

In this connection, a few remarks on what is generally designated as Liebig's tea would appear appropriate.

The following method of making this preparation, quoted from the *Annalen der Chemie*, will be found in the *American Journal of the Medical Sciences* for April, 1855, page 498:—

"*New Broth for the Sick.* By JUSTUS LIEBIG.—To prepare this broth, half a pound of the flesh of a recently killed animal (beef or the flesh of a fowl) is chopped fine, and well mixed with a pound and an eighth of distilled water, to which four drops of pure muriatic acid and from half to a drachm of common salt have been added. After an hour the whole is

thrown on a common hair sieve, and the fluid is allowed to run off without pressure. The first portion, which is turbid, is poured back, until the fluid runs off quite clear. On to the fleshy residue in the sieve half a pound of distilled water is thrown in small portions. In this way a pound of fluid (cold extract of meat) is obtained, of a red color, and of an agreeable taste of broth. The sick are allowed to drink a cupful cold at pleasure. It must not be heated, as it then becomes turbid, and deposits a thick coagulum of animal albumen and hæmatin."

In this preparation the solution contains the salts, extractives, and albuminous matters of the muscular juices, a certain amount of hæmatin, and even a small quantity of the musculin. To its nutritive powers, moreover, it adds the tonic effects of the dilute mineral acid. It is to very many an acceptable preparation, and is worthy more attention than it has received in this country. In warm weather it rapidly putrefies, and should, therefore, be kept on ice; moreover, it should not be made of meat more than a day old. Of course it should be used the day it is made, and never kept longer. Properly prepared, this form of beef tea is especially to be commended where other varieties produce nausea and vomiting. It is not, however, a concentrated article; a thousand grains evaporated to dryness yield only on an average about fifty grains of dry residue.

Besides the several preparations of beef above described, raw beef itself may often be used with advantage in prostrate cases. The use of raw beef as an article of diet in fever deserves thorough investigation, in view of the success which has recently at-

tended its employment in the bowel affections of children. Tender lean beef should be selected for this purpose, should be finely grated and rolled into little pellets of five to ten grains each. These may be dusted with flour, and given like so many pills, two, three, or more at a dose, every two hours. The pellets should be made the day they are used, and not kept from day to day. This method of nourishing fever cases has already been employed to some extent during the present war, but not largely enough to decide upon its general adaptability. It is well worthy the most serious consideration.

The general indications for the use of one or any of these preparations of beef are quite similar. The object is to nourish without disordering the enfeebled digestion of the sick man. In the early stages of the disease, while the prostration is but moderate, the more dilute solutions should be employed. At a later period, when the adynamic condition becomes extreme, and the pulse very frequent and feeble, the more concentrated articles should be used. In either case the surgeon should prescribe the quantity to be given at a time, and the periods of administration, so as to regulate the amount given in the twenty-four hours, and to avoid overloading the stomach by the quantity given at once. The nurse should receive specific directions from the surgeon, and should administer the beef tea or beef essence strictly according to directions, as in the case of medicines—a tablespoonful, a fluid ounce, or two fluid ounces being given every two hours.

Should the article employed disagree with the patient—as indicated by obstinate repugnance, or by

gastric uneasiness, nausea, or vomiting after taking it—it should be abandoned, and some other preparation substituted. When the prostration is great, wine-whey or milk-punch may be conjoined with the beef tea and administered alternately.

Toward the middle or latter part of the third week of the disease a greater variety is usually needed in the diet. The repugnance for food, which is often one of the most serious obstacles to be encountered, can often be overcome, to a certain extent at least, by judiciously varying the articles offered: oyster soup may be substituted, in part at least, for the preparations of beef; even the oysters themselves, raw or stewed, may be allowed, if their use is not followed by symptoms of indigestion. A soft-boiled egg, or a poached egg laid on a piece of softened toast, may be occasionally allowed. In the form of egg soup, this nutritious article of diet may be used much earlier in the disease in prostrate cases. The following is a receipt for this preparation, which is often very acceptable:—

"Beat an egg perfectly light, beating white and yolk at first separately, and when light mixing them well together with a teaspoonful of powdered sugar and a little nutmeg; while stirring briskly, pour in a wineglassful of boiling water, add a wineglassful of sherry wine, and it is ready for use."

When convalescence has fairly set in, the appetite usually returns, and often becomes voracious. It is, however, highly important to regulate the food until the patient is completely restored to health. The diet should be simple, nutritious, and readily digestible; plain soup, with boiled, roast, or broiled beef, mutton, or poultry, may be used for dinner, associated with

properly prepared and digestible vegetables, such as potatoes, roast or boiled, and, when they can be obtained, stewed tomatoes in moderate quantities. Should the patient, however, earnestly crave even apparently indigestible articles, such as sour-crout or pickles, it is usually well to indulge his longings in moderation, unless after trial the food desired is found to produce bad results. In a general way, the danger at this period is not so much from the use of any particular article of ordinary diet as from overloading the digestive organs by the great excess to which the appetite of the patient sometimes urges him to go. Against this danger both he and his attendants should be fully warned. Fatal relapses not unfrequently date back to palpable excesses in diet.

In the scorbutic variety, the milk diet deserves, if possible, greater prominence than in ordinary cases; the combination of vegetables with the beef tea, as in the receipt on p. 126, becomes more desirable, and a greater prominence should be given to vegetables in the diet of convalescence. It is to be observed, however, that the vegetable food employed must be so prepared as to be readily digestible or it is in itself pernicious; properly cooked potatoes, tomatoes, even roasted apples and the like, in moderate quantities, so far from increasing the diarrhœa of convalescents from the scorbutic form of typho-malarial fever, will co-operate with other measures in its cure. The reckless administration of vegetable food in these cases, however, is full of danger, and a single decided fit of indigestion may have the most unfortunate results.

The foregoing brief remarks may serve as an outline of the diet appropriate to typho-malarial cases.

The space appropriated to the subject in this work does not allow further details, which, however, are well worthy of a volume. Large opportunities of observing the practice in the United States military hospitals has convinced the author that practically this subject has not yet received the careful attention which it deserves; that the efforts hitherto made to better the hospital diets have had reference rather to bettering the diet of convalescents (the *full* diet of the hospital) than to the improvement of the means available for the nourishment of fever cases during the febrile stage. He fears that too often the ward surgeons are more intent in regulating the administration of medicines than in attending to the nice adaptation of dietetic measures to individual cases, and he would willingly lend any influence in his power to give prominence to this important portion of the treatment.

The *therapeutic measures* vary still more than the dietic with the peculiarities of individual cases. There are no remedies which deserve the name of specific, and none which can be relied upon to cut short the disease. It is true that in those cases in which the malarial element is very prominent, and the tendency to periodicity marked, the administration of the sulphate of quinia in full doses will often break up the periodic character, with a decided amelioration of all the symptoms; but, except in this group of cases, the action of quinia appears quite unable to modify decidedly the progress of the disease.

The treatment most productive of good results consists in meeting the various complications and unpleasant symptoms as they arise, and in the judicious

administration of alcoholic stimulants, in conjunction with the dietic supporting measures already described, during the period of prostration. Alcoholic stimulants should not, however, be given recklessly. There is always a possibility of over-stimulation. The author is satisfied that this potent agency is readily misused, and that it is daily abused, especially by young and inexperienced practitioners. Stimulants are first indicated when the prostration which accompanies the disease continues decidedly to increase in spite of the supporting diet resorted to. Probably the best form to begin with is sherry wine, either alone or with milk, as wine-whey. Port wine, which, from its astringent properties would be so desirable in cases in which the diarrhœa is prominent, is not available in this country on account of the adulterations practiced. If the prostration continues to increase, milk-punch or pure brandy or whisky may be substituted, whisky being, as a general rule, preferable, on account of the numerous sophistications practiced by dealers in the brandy at present supplied to the American market, although there is no doubt that *pure* brandy is by far the better article for use in fever cases.

No fixed rule can be laid down for the quantity of wine or whisky to be used daily in any individual case. It may vary from two to sixteen ounces of either, in accordance with the characteristics of the case and the previous habits of the patient. In any case, the quantity to be administered in the twenty-four hours should be definitely prescribed by the physician, who should also indicate the periods of administration and the quantity to be given at a dose.

Should the quantity directed fail to produce the desired supporting effect, should the pulse increase in frequency and feebleness, and the patient continue to sink, it should be increased. Should, on the other hand, the cerebral symptoms be aggravated, the pulse rendered stronger and more frequent, the skin hotter, and the secretions become more scanty after each dose, the quantity should be diminished, or stimulants should be temporarily or altogether abandoned, according to circumstances.

In like manner no rule can be laid down as to the period of the disease at which the use of stimulants should be commenced. In some cases they are altogether unnecessary, while in others they are demanded almost from the very onset. Perhaps, however, in the majority of cases the indication for their use becomes apparent some time in the course of the second week.

A correct understanding of the purpose to be effected by this class of remedies, with a careful appreciation of the condition of the patient, is the best guide to their use in any case. It is to be borne in mind that alcoholic liquors are not specific curative agents, that their use is simply to support the powers of life, and prevent the vital energies from sinking below the point at which the reparative processes are possible. After all, it is by the natural recuperative powers of the individual that life is saved, and where these appear to be equal to the task, without the aid of stimulants, these are unnecessary, if not positively hurtful.

The state of the bowels, of the skin, and of the kidneys require to be observed, and if noteworthy derangements occur, they demand attention.

If the *bowels* are constipated, as sometimes happens at the commencement of the disease, mild laxatives should be resorted to, such as rhubarb, magnesia or its citrate, Rochelle salts, Seidlitz powders, or castor oil. Brisk purgation should be carefully avoided; so far from influencing the course of the disease in a beneficial manner, by the depression produced it may prove positively hurtful.

In by far the majority of cases, however, instead of constipation diarrhœa exists. This does not usually require treatment; it is to be regarded as an eliminative process, which probably exercises on the whole a beneficial influence on the progress of the disease. It should not be interfered with unless so excessive as to be itself a cause of debility and thus to lend its influence in adding to the general prostration. In this case simple measures should be resorted to, to keep it within bounds; moderate doses of chalk mixture, of Hope's camphor mixture, sometimes of one of the mineral acids, with or without anodyne enemata, will usually succeed in producing an impression sufficient for the purpose.

If the skin is dry, parched, and the calor mordax decided, mild diaphoretics are indicated. The solution of the acetate of ammonia, neutral mixture, or effervescing draught, in half-ounce doses, are the remedies to be preferred for this purpose. Often no other therapeutic agents are needed during the first few days of the febrile action than one of these diaphoretics, administered with punctuality.

As a local measure, calculated to produce a beneficial effect upon the skin, sponging the surface may be mentioned. Tepid water, or spirits and water are

used, of which the latter is preferable. The whole surface should be sponged over, a part at a time, so as not to expose the patient to taking cold; the operation may be repeated once or twice daily, or even oftener. It is followed by a moderated temperature and increased secretion of the skin, and, as a rule, by a diminution of any nervous symptoms which may be present.

The *state of the kidneys* is a matter of very considerable importance. As has been already indicated, the urine is usually scanty and high colored, and during the greatest violence of the disease partially or completely suppressed. The latter condition usually coexists with grave cerebral disturbance. The indication in such cases is clear. Whenever the urine becomes decidedly scanty, especially if cerebral symptoms are present, diuretics should be resorted to. The acetate of potash, in half-drachm doses, every three or four hours, answers very well in these cases. The same may be said of the sweet spirits of nitre, in teaspoonful doses, and of digitalis, which has the additional advantage of diminishing the frequency of the pulse, but which must be administered with caution, lest the prostrating effect of the excessive use of the remedy add to the debility already existing. In this class of cases gin may often be used advantageously instead of other alcoholic stimulants. The action of any of these agents may be increased by the administration of demulcent drinks.

Retention of urine frequently occurs, especially in comatose cases. For this condition the surgeon should always be on his guard; daily inquiries should be made, and percussion over the hypogastric region

should be resorted to, to ascertain the state of the bladder. The use of the catheter affords ready means of relief. Neglect of this precaution may be followed, in extreme cases, by rupture of the bladder, with fatal results.

The condition of the *brain and nervous system* requires special attention. If there is merely restlessness, watchfulness, with occasional muscular twitchings, Hoffmann's anodyne or camphor-water will answer an excellent purpose, if, indeed, medication is required; but when there is obstinate sleeplessness, with an aggravation of all the nervous disturbances during the night, decided anodynes should be resorted to. Some difference of opinion exists on this subject, and the use of opiates in this fever has been loudly decried by skillful surgeons who have had good opportunities for observation; nevertheless, there can be but little doubt of the advantages to be derived from their judicious use. Some preparation of morphia is usually to be preferred, and to decrease the effect of this drug, in diminishing the secretions, it should be combined with ipecacuanha, or with extract of hyoscyamus. The dose should be large enough to produce sleep; small doses stimulate and aggravate rather than diminish the nervous disorder. One-fourth of a grain of acetate or sulphate of morphia, made into a pill with two grains of extract of hyoscyamus, may be administered in the evening an hour or two before it is desired to make the patient sleep; he should afterward be kept as quiet as possible. If this does not produce sleep, the dose may be repeated about two hours subsequently, but should not usually be pushed beyond this point. Opium and quinia are also an

excellent combination; a grain of opium may be combined with two of quinia, and given at bedtime, and the dose may be repeated if a single pill does not produce sleep.

Dover's powder is preferred by many practitioners on account of its effect upon the skin. In ten or fifteen grain doses, however, which are often insufficient to produce more than a few hours sleep, the quantity of ipecacuanha contained frequently causes nausea or vomiting. Perhaps the best method of administering Dover's powder is in combination with camphor, half a grain to a grain of powdered camphor being made into a pill, with three or four grains of Dover's powder, and administered every two hours until sleep is produced.

In any case the effect of the anodyne used must be carefully watched. It may be known that beneficial effects have been produced if sleep follows its administration, without an increase of the delirium, without suppression of the secretions, and without being followed next day by an aggravation of the usual morning symptoms.

If, on the other hand, after cautious trial, the use of this class of remedies is followed by an aggravation of the symptoms; if, as sometimes happens, instead of producing sleep, the patient is as wakeful as ever, the delirium decidedly increased, and the secretions checked, they should be at once abandoned.

The *delirium*, as a measure of the degree of cerebral disturbance, should be carefully observed; usually it requires no special treatment—the measures indicated in directing the general conduct of the case being those best suited to control this symptom.

Certain measures, however, which have a special reference to the cerebral disorders of the disease, may be mentioned in this place.

So soon as the character of the disease is fully recognized, the hair should be cropped short. This measure is indispensable to cleanliness, and prevents the propagation of vermin, which goes on most luxuriantly upon the sick. It usually also gives great comfort to the patient. It is not necessary to shave the head, except in the rare cases in which it is desirable to apply a blister to the scalp.

If there is much headache, cloths wrung out of cold water may be applied to the forehead, or bladders containing ice may be cautiously applied. The latter remedy should be used with the utmost circumspection. There is not only the danger of producing frost-bite of the scalp, but, by diminishing the temperature of the brain, of producing fatal prostration. Perhaps the safest way of employing ice to the head is by inclosing small lumps of ice in a bladder, with at least an equal bulk of lard; under these circumstances the ice melts very slowly, and the diminution of temperature produced by it is far more moderate than in the ordinary methods of applying ice.

Delirium is not to be regarded as contraindicating the employment of alcoholic stimulants; on the contrary, under the effects of their administration, it is usually found to moderate along with the other symptoms of the disease. It is only when the delirium is decidedly increased by these agents that they should be abandoned.

In severe cases, where the delirium passes into pro-

found coma, benefit is sometimes derived from the application of a blister to the back of the neck, or to the surface of the scalp. This measure, formerly fashionably applied in almost every case accompanied by decided delirium, should be limited to the group of cases above indicated.

Certain remedies have, from time to time, enjoyed an ephemeral reputation as exerting a specific influence on the intestinal ulcerations. Prominent among these are the nitrate of silver and the oil of turpentine.

The *nitrate of silver* is no doubt a valuable agent in those cases in which it is desirable to check excessive diarrhœa. The author is not, however, satisfied, by its behavior in his hands, that it is beneficial in any other way. At the present moment he is not acquainted with a single army surgeon of experience who habitually resorts to it.

The *oil of turpentine*, to the employment of which, in ordinary enteric fever, the attention of the profession was first invited by Dr. Geo. B. Wood, is claimed by many, as well as by the distinguished physician who suggested it, to exert a peculiar power on the intestinal lesion. It is certainly a valuable adjuvant to alcoholic stimulants in obstinate cases, accompanied by suppressed or greatly diminished secretions.

Although prejudiced in favor of the remedy by the partiality of his venerable preceptor, Dr. Wood, the author has not found it so generally available, either in the typhoid fever of civil life or in the treatment of the similar affection of the bowel in camp fevers, as he had been inclined to hope.

In a large class of cases it is not borne; it disorders the bowels, increases the diarrhœa, and is necessarily abandoned. But even in those cases in which it is tolerated, it does not exert any decidedly favorable influence on the progress or degree of any of the abdominal symptoms, except, perhaps, the tympanites, which usually diminishes under its use.

As a decided stimulant, however, the oil of turpentine may often be advantageously conjoined with alcoholic liquors. The period for its administration is especially during the prostration and diminished secretion of the second and third week of the disease. It may be given in emulsion, in the dose of ten drops every two hours.

Yet another remedy is the *chlorate of potassa*, which has recently come into somewhat general use in various forms of adynamic disease. It has been recommended in typhoid fever, under the erroneous idea that it would supply oxygen to the blood, the hypothesis being that it is to the deficient oxygenation of the blood that the adynamic symptoms are due. Although there is every reason to believe that these theoretical views are quite unfounded, chlorate of potassa has proved valuable in many cases, acting probably as a powerful evacuant (diuretic and diaphoretic), which has no depressing influence. It is especially adapted to the deficient secretion and heat of skin of the second and third week, and to cases in which the cerebral phenomena are marked. The dose is from ten to twenty grains in solution, every two hours.

Such is a general outline of the course of treatment ordinarily desirable in typho-malarial fever in its sim-

plest manifestation. There is, however, one important preparation especially adapted to the whole group of cases in which the malarial element manifests itself in a more or less decided tendency to periodicity, and this is the *sulphate of quinia.*

In the group of cases described above as beginning with a decided chill, followed during the next few days by a fever more or less distinctly remittent, the quinia should be given during the first remission after the character of the disease is fully recognized, in full doses, eighteen to twenty-four grains being administered, in divided doses of two or three grains. Even in febrile cases beginning much more insidiously and running a much more gradual course, should distinct periodicity in the febrile phenomena be at any time recognized, the quinia should be resorted to.

The administration of quinia will, it is true, seldom cut the disease short. Its effects are less complete than in ordinary cases of malarial fever; but, under the circumstances above indicated, it seldom fails to exert the happiest influence; the febrile exacerbations disappear, and although the enteric phenomena are not cut short, they appear to run a modified and very much more moderate course. If the first full dose of quinia fails to produce the effects above indicated, it should be repeated the following day in full dose; if this fails completely, the remedy may be abandoned. Should its influence, however, although not complete be clearly recognizable, it may be continued in moderate doses, say of five grains twice a day for several days.

But it is not only in those cases in which the fever

assumes a periodic form that sulphate of quinia exercises a happy effect. Cases which present any other evidences of the malarial influence are equally benefited by its administration. The icteroid hue of skin, the hepatic tenderness, the spleen enlarged more decidedly than in ordinary typhoid fever, and kindred phenomena, are so many indications for the use of quinia. In this second class of cases the alkaloid is to be given in moderate doses, patiently continued throughout the course of the complaint, or until the symptoms by which it was indicated have disappeared.

It is to be understood that no peculiar or specific action is claimed for quinia in these cases; nothing in fact but its influence over malarial affections so long well known. It is over the malarial element in this disease that the quinia exerts its power. The enteric phenomena are either not modified at all or only indirectly so by the subtraction of one of the co-operating morbid conditions. The scorbutic phenomena are equally untouched. Hence it will be readily understood that in cases in which the malarial element is but very slight, and in which either the enteric lesion or the scorbutic influence is the prominent morbid condition, the quinia will fail to exercise any beneficial influence on the progress of the disorder; and this failure has discouraged some from the use of quinia in any of the forms of this disease. A fatal mistake, which deprives the surgeon of one of the most potent therapeutic agents at his command.

These considerations with regard to the action of quinia at once present a clew to the effect of *arsenic* in this fever, concerning which much has been said in certain quarters. Some have even gone so far as

to claim for arsenic a specific influence over the typhoid (typho-malarial) fever of our army. It may be used in the form of Fowler's solution in doses of three to ten drops, given after meals, three times a day.

An interesting paper on this subject has recently been communicated to the Surgeon-General's office by Surgeon A. L. Cox, U. S. V. In this paper, which will be published in full in the Medical History of the War, Surgeon Cox claims for arsenic an especial effect upon the intestinal lesion of this fever; speaks of it as an "anti-ulcerative," and insists that it exercises a peculiar and most beneficial effect upon the follicular disorder, and shortens materially the duration of the disease.

Surgeon Cox prefers solid arsenious acid to Fowler's solution; he gives it in the form of pill, three grains of arsenious acid being combined with three of opium, and divided into thirty-two pills; one of these pills is given three times a day, always after eating.

There can be no doubt that arsenic in either of these forms is, like quinia, a valuable agent in the treatment of the malarial variety of the fever; the reader will, however, be prepared for the statement that it is in this class of cases only that it will be found efficacious, it being merely by its acknowledged power over malarial affections that any beneficial influence is exerted.

Special complications occurring during the disease will of course require to be met by appropriate remedies.

Bronchitis, if not accompanied by troublesome cough, seldom requires any measures except the

general treatment appropriate for the fever. Should the cough prove annoying, however, small doses of Dover's powder (two or three grains), repeated every two hours, or oftener if necessary, will prove advantageous, or any of the preparations of morphia or other anodynes may be used to allay it. For further details, see Chapter VIII., on Catarrhal Affections.

Pneumonia is a more serious complication, perhaps almost as much on account of the dangers attending the injudicious treatment too often addressed to it as on account of any perils of its own.

Whatever difference of opinion may exist as to the propriety of general blood-letting in the sporadic pneumonia met in civil practice, there can be no doubt that it is entirely inappropriate in the pneumonia which complicates typho-malarial fever. On this point army surgeons appear to be perfectly agreed. There has probably been no surgeon during the present war bold enough to bleed from the arm in these cases. Opinion is not so decided as to local blood-letting, and many surgeons claim that they have applied wet cups with advantage. The truth of this statement is not denied, but quite as decided local relief is produced by *dry cupping*, without any of the debility and exhaustion which, in this fever, almost invariably follows the general or local loss of blood.

Equally inappropriate are antimonials and mercurials in this form of pneumonia. In fact, all the theoretical and practical objections recently brought forward in England against the use of blood-letting, antimonials, and mercurials in ordinary so-called sthenic pneumonia, apply with tenfold force to the form of the disease now under consideration. Neither the

antimonials nor blood-letting have been very generally used in this affection during the present war, but perhaps for this very reason mercurials have been too generally resorted to. It must be admitted that they have been very frequently administered in the severer pneumonic cases, and it is to be feared with the effect of increasing the mortality of the affection.

A much simpler and less heroic treatment than that generally resorted to is productive of the best results. The lungs should be kept quiet, and the cough lulled by full doses of Dover's powder or some other anodyne frequently repeated; dry cups or flying blisters should be applied to the chest, and the general treatment appropriate to the fever should be pursued in other respects precisely as if the complication did not exist. (See Chapter IX.) The use of seneka, carbonate of ammonia, and other stimulating expectorants is sometimes advantageous in the latter stages of the affection.

Intestinal perforation, when it occurs, proves generally fatal in the course of from twenty-four to forty-eight hours. It has been recommended in these cases to administer opium, or some of the salts of morphia in large doses, and this plan is undoubtedly desirable as well to lull the suffering of fatal cases as for any chance of life it may offer.

Cerebral meningitis, when it occurs as a complication of typho-malarial fever, is always of a most adynamic character, and bears neither blood-letting, antimonials, nor mercurials better than the intercurrent pneumonia above described. It is to be treated by the application of dry cups to the back of the

neck, sinapisms and hot mustard baths to the feet, by the use of alkaline diuretics, diaphoretics, and other gentle evacuants. Contrary to what is generally stated, a nutritious liquid diet and the use of alcoholic stimulants are not contraindicated by the presence of this affection, which is rather benefited by their use during the existence of the same constitutional conditions which would indicate them were no meningitis present.

The slow convalescence which follows typho-malarial fever is to be managed by a generous diet and the free administration of chalybeates and other tonics.

Of the *sequelæ* of the affection, the treatment of the diarrhœa which sometimes follows it will be given in the chapter on Camp Diarrhœa. The albuminuria, with or without anasarca, which not unfrequently occurs during the convalescence, is to be treated with mild alkaline diuretics, combined with the use of tonic doses of quinia and iron; the enlarged spleen which sometimes exists, by the prolonged use of quinia and iron; the cardiac irritability, rheumatoid pains, muscular debility persisting after the patient has regained his usual weight, and other evidences of a scorbutic tendency, by a generous and nutritious diet, in which fresh succulent vegetables in sufficient variety should be made to play a prominent part. Attacks of ordinary intermittent, which are not unfrequent during convalescence, should be treated by quinia, as indicated in the next chapter.

SECTION II.

Diseases which may be confounded with Typho-Malarial Fever.

Certain well-known affections occur occasionally among the troops which may be confounded with typho-malarial fever. These are remittent fever and typhoid fever, each of which closely approximates a certain group of typho-malarial cases; and typhus and yellow fevers, which ought to be discriminated with great ease. A few remarks will be made in this section on each of these diseases in their relation to typho-malarial fever, and especially with a view to the diagnosis.

I. *Bilious remittent fever* resembles most closely those typho-malarial cases in which the malarial element predominates; beginning abruptly with a chill, a fever follows, with more or less distinct remissions, for a week or more, when, if not cut short or transformed into an ordinary intermittent, it becomes continued, and assumes a typhoid type. The adynamic symptoms, however, which, although not usually so, may be quite as severe as in typho-malarial fever, are unaccompanied by any of the strictly enteric phenomena. There is usually constipation throughout the disease; there is no gurgling or tenderness on abdominal pressure, no rose spots or tympanites, and in fatal cases post-mortem examination shows no disease of the intestinal follicular apparatus.

Cases of this simple form of remittent fever undoubtedly have occurred and still do occur among our troops. Such cases were especially observed in the army of the Potomac during the winter of 1861. The great majority of the cases reported under the head of remittent fever are, however, typho-malarial fever, and are complicated not merely by the enteric phenomena described in connection with that disease, but also by the peculiar constitutional (scorbutic) conditions which result from the protracted use of camp diet.

Bilious remittent fever, as a general rule, yields more promptly and completely to the use of quinia than is the case with typho-malarial fever. Given in full doses during the early remissions, quinia will very generally put a stop to the progress of the disease.

II. *Enteric* or *typhoid fever* in many respects approximates closely to that form of typho-malarial fever in which the enteric phenomena predominate. The differences, however, are such that the army surgeon will readily make a diagnosis in the majority of cases.

In its insidious commencement, in the adynamic symptoms of the second and third week, in the nervous disorder, the delirium, the diarrhœa, the abdominal phenomena, and, as we have already seen, in the intestinal lesion, the two disorders closely approximate.

The epistaxis of the early stages, the rose-colored rash of the second week, and the decided tympanites of the advanced periods of the disease are, however, very generally absent from the typho-malarial dis-

order, and when present are less decidedly marked than in enteric fever. Besides the frequent absence of these characteristic symptoms, the presence of a certain marked degree of periodicity in the febrile action, or of a certain icteroid hue of the skin, with more or less hepatic tenderness, or gastric uneasiness, or considerable splenic enlargement, or usually of several of these phenomena, will lead to the recognition of the malarial element of the disease; while conjoined with these, the state of the tongue in the early stages and during the convalescence, the peculiar complexion, and other symptoms of the incipient scorbutic tendency will lead to the ready recognition of the presence of this influence. Undoubtedly genuine cases of simple enteric fever have occurred and still occur in considerable numbers among the troops. At the same time, it is almost certain that a large majority of the cases reported to the Surgeon-General's office as typhoid fever are not of this simple form, but belong in fact to one or another of the forms of typho-malarial fever.

So far as the practical considerations of treatment are concerned, this difference of opinion is not to be despised; it is not a mere battle for a name. The pathological views indicated in the last section lead, as an inevitable result, to a jealous investigation of each individual case for the evidences of the presence of the malarial or scorbutic taints, and to the prompt employment of quinia in the one instance, and an antiscorbutic regimen in the other, and there is little doubt that by adopting this course the mortality will be materially less than if the plain course of treatment adapted to ordinary enteric fever be the plan pursued.

The treatment adapted to ordinary enteric cases is quite similar to that laid down in the last section for typho-malarial fever, except that quinia is to be avoided as useless, if not positively hurtful, and that in these simple cases the regimen may be prescribed without any reference to the scorbutic tendency, which is so common in the typho-malarial form above described. To these exceptions it may perhaps be added, that the necessity for stimulation is greater, as a general rule, in typho-malarial than in simple typhoid fever.

III. *Typhus Fever.*—Typhus fever has been exceedingly rare in our army during the present war. The author has not seen a single case, though he has several times seen patients supposed by their attending surgeons to be laboring under the disease. At the same time he must confess to have seen detailed descriptions of several small groups of cases occurring at various points throughout the army, in which he is satisfied the diagnosis was correct. The numerous errors which he believes have been made with regard to this disease are doubtless due to the fact that, except in the great Atlantic cities, in which it is occasionally imported or produced, typhus fever is exceedingly rare in the United States where the enteric form of fever appears endemic, and hence many surgeons came to the field expecting, from the experience of other armies, to find typhus the prevailing fever, but without any knowledge of its phenomena based upon personal observation. Is it surprising that, under such circumstances, and with the small personal knowledge of scurvy possessed by most of our sur-

geons at the breaking out of the war, cases of the severer scorbutic forms of typho-malarial fever were occasionally described as typhus?

The following may be presented as a brief outline of the symptoms of genuine typhus fever:—

After the usual preliminary symptoms, especially malaise, pains in the back and limbs, nervous disturbance, headache, etc., continued often for several days, the patient is seized more or less abruptly with a chill, followed by fever. The tongue is at first moist, and coated with a whitish fur; the face suffused with a dusky, livid flush, much deeper than the characteristic hue of typhoid cases; the bowels are constipated; the abdomen shrunken, and the urine scanty. The fever rapidly assumes an adynamic character; the pulse becomes frequent and feeble; delirium sets in; the tongue becomes dry and brown; sordes collect upon the gums and lips, and the patient dies, or toward the close of the second week begins to amend, and finally recovers.

During the progress of the affection certain symptoms generally occur by which its true nature is readily recognized. Prominent among these is the peculiar typhus eruption, which consists of numerous small reddish or purplish, livid, slightly raised spots, varying in size from that of a pin's head to half an inch in diameter. This eruption, which has given rise to the designation spotted fever, appears about the close of the first week, or even earlier, and lasts ten or twelve days. Other prominent symptoms are the intense and pungent heat of skin, and the extreme frequency of pulse occurring early in the disease. There is also during the attack a tendency to

congestion of the lower and posterior portions of the lungs, evidenced by dullness on percussion, and a low form of pneumonia of one or both lungs frequently sets in.

The points to be relied on, in the diagnosis of typhus fever from enteric and typho-malarial, are the following:—

Its shorter duration; the severity and abruptness of the attack; the presence of the peculiar typhus eruption; the greater intensity and energy of the adynamic phenomena in typhus; the peculiar and intense heat of skin; the frequency of pulse early in the disease; the more intense duskiness of countenance; the decided and characteristic stupor; and, finally, the absence of diarrhœa, and of all the abdominal phenomena of the enteric or typho-malarial fevers. Attention to these points will generally make a diagnosis easy.

But, besides these points, typhus fever seldom occurs sporadically; it most generally attacks a number of individuals simultaneously, or nearly so; it is apt to occur epidemically, and the majority of practitioners believe it to be propagated by contagion. Without discussing this latter opinion, for which the present is not an appropriate opportunity, it may be remarked that if it is correct, this fact is sufficient to prove that most of the scattered instances reported during the present war were probably not typhus, since it is nowhere pretended, by those who have reported them, that these cases served as a nucleus for the spread of the disease.

The cases of typho-malarial fever most readily confounded with typhus are those severe ones in which

sometimes the scorbutic tendency manifests itself in petechiæ and blotches, which a superficial or new observer might readily confound with the typhus eruption. The slow and gradual commencement of the disease, its greater duration, and, above all, the presence of the enteric phenomena, will generally enable a prompt diagnosis to be made.

It is also probable that certain cases of congestive intermittent fever, occurring in patients presenting a scorbutic state of system, have been confounded with typhus. This possibility will be discussed hereafter in connection with the subject of congestive intermittents.

The treatment of typhus is in most respects similar to that of enteric fever, except that of course stimulants and nourishment must be administered more promptly and energetically, and that all modifications of treatment based on the peculiar enteric phenomena are unnecessary in typhus. The convalescence from typhus is usually more rapid than from typho-malarial or enteric fevers.

IV. *Yellow Fever.*—It might appear that yellow fever was still less likely to be confounded with typho-malarial than any of the diseases above mentioned. Nevertheless, quite a number of cases were reported in the army of the Potomac during the fall of 1861 and the summer of 1862, and in other situations where it is well known no such disease occurred. Such of these cases as were investigated by competent observers proved to be typho-malarial fever accompanied by hepatic disorder and a more or less decided icteroid hue. In view of the possi-

bility of this error, a brief summary of the chief diagnostic points may be here presented with advantage.

Yellow fever is characterized by a preliminary febrile stage beginning with a chill, and varying in duration from a few hours to several days, followed by a period of more or less complete remission, which is seldom more than twenty-four hours in duration, after which, in unfavorable cases, a period of prostration or collapse; in favorable ones a low, continued fever sets in. Frontal or superciliary pain, with congestion of the conjunctiva, are among the earliest symptoms, and frequently precede the chill of the preliminary fever. The yellowness of skin, from which the disease derives its name, makes its appearance during the first stage, and progressively increases until in well-marked cases the skin is of a bright-yellow color. Nausea and vomiting set in during the preliminary fever or the remission which follows it. The matters vomited are at first any food the stomach may contain, then mucus, with or without biliary matters, and finally the redoubtable black vomit, of which so much has been written, and the color of which is in fact simply due to the presence of blood more or less altered. In fatal cases death usually takes place during the first week of the disease; in favorable cases the disorder is seldom prolonged more than two or three weeks.

The points indicated in this brief outline ought to suffice for the diagnosis in all ordinary cases; but, in addition to these, certain facts with regard to the general habits of the disease should be borne in mind. Yellow fever seldom occurs as a sporadic

affection, or away from its usual haunts; it appears epidemically, and in certain situations and seasons of the year, rarely making its appearance before midsummer, and disappearing with the first frosts of winter. Its favorite localities in the United States are the seaboard cities of the cotton States, and especially Charleston, Savannah, Mobile, and New Orleans. It is also frequently observed along the banks of the rivers of the Gulf States, but seldom in the interior of the country remote from the water-courses. It has been known to occur epidemically as high north as Philadelphia and New York, but not to any extent for many years, although a few imported cases are sometimes observed during the summer months.

During the early period of the rebellion, the Southern press was jubilant over the ravages which this scourge was expected to make among the Federal armies in the Southern States. Up to the present time, however, this anticipation has not been realized. Even the army occupying New Orleans, the favorite haunt of the disease, has escaped, thanks to the intelligent and energetic manner in which General Butler enforced the hygienic precautions recommended by Surgeon T. H. Bache, medical director of his expedition. So that the only yellow fever reliably reported in the army from the commencement of the rebellion to July 1, 1863, was the outbreak at Key West, Florida, in the summer and fall of 1862, and a few cases at Hilton Head, South Carolina, during the same period.

The detailed facts of this epidemic, which, however, only involved a few hundred individuals, will

be presented in the Medical History of the War. The following resumé has been condensed, by permission, from the official reports:—

The fever first made its appearance at Fort Taylor, Key West, Florida, shortly after the arrival of the bark Adventure from Havana, where the disease existed. This vessel was quarantined, but the fever broke out on her while she lay in quarantine, and the patients were received into the Marine Hospital at Key West. At that time six companies of the 90th New York Volunteers were stationed at Key West, two companies in Fort Taylor, and the rest in camp about a mile from the fortification. The first case occurred July 28th, 1862. The patient belonged to one of the companies stationed in the fort. The first case was rapidly followed by several others in both the camp and the fort; then a few days elapsed without any others being attacked, and again once more the disease broke out with virulence, fifteen to sixteen new cases occurring daily in the little command.

The epidemic continued unabated until the 8th of September, after which it gradually diminished, and finally disappeared October 15th, subsequent to which no new cases occurred among the troops. During its continuance 63 per cent. of the troops were attacked, and 12·6 per cent. died, the deaths being at the rate of one to every 4·5 cases. The above facts are derived from the reports of Surgeon E. S. Hoffman, of the 90th New York Volunteers, and Assistant Surgeon Wm. F. Cornick, U. S. A., both of which reports will be hereafter published in full in the Medical History of the War.

The outbreak at Hilton Head followed the arrival

of a vessel from Key West, in September, with the disease on board. According to the reports of Assistant Surgeons J. E. Semple and J. Bell, U. S. A., all the cases which occurred were limited to the neighborhood of a salt-water marsh, in which much filth and garbage had accumulated; and cases originating here, when transported to a previously healthy neighborhood, did not serve as a center for the further spread of the disease. Thirty-one cases were transferred to the general hospital at Hilton Head, and of these twenty died, but the disease did not spread to the other patients, and no new cases originated in the hospital. The disease terminated about the middle of November, 1862.

The treatment of yellow fever consists of gentle diaphoretics during the febrile stage, of remedies addressed to the vomiting, such as acetate of lead, blisters or sinapisms to the epigastrium, and the like, and finally, of stimulants and nutrients during the period of collapse or of consecutive fever. Certain specific forms of treatment have been urged, such as quinia in large doses, mercurials pushed to salivation, etc.

The author's personal experience is too limited to enable him to pronounce confidently upon these various methods, and he refers his readers to the treatises on yellow fever for their discussion. The medication employed in the epidemic above mentioned at Key West and Hilton Head may, however, be here briefly alluded to. The treatment resorted to by Surgeon Hoffman and Assistant Surgeon Cornick at Key West appears to have consisted in the use of a cathartic followed by the repeated administration of large doses of the sulphate of quinia (ten to thirty

grains every three or four hours). The treatment at Hilton Head appears, from the reports of Assistant Surgeons Semple and Bell, and Acting Assistant Surgeon T. T. Smiley, to have consisted in the employment of twenty grains each of sulphate of quinia and *calomel* every two hours. How far the malignant character which these latter cases were said to assume, and the fatal termination which so generally resulted, must be regarded as connected with such heroic therapeutics, is a matter for serious consideration.

CHAPTER IV.

INTERMITTENT FEVERS.

Besides the typho-malarial fevers described in the foregoing chapter, fevers of simple malarial origin have been sufficiently abundant among our troops. Under the several heads of quotidian, tertian, quartan, and congestive intermittents, 72,810 cases were reported to the Surgeon-General's office during the year ending June 30th, 1862, in reports representing an average annual mean strength of 281,177 men; so that 259 men of every thousand, or more than one-fourth of the whole army, suffered from these affections during the year. Of these, 40,375 cases and 32 deaths were reported under the head of quotidian, 26,750 cases and 33 deaths as tertian, 3451 cases and 4 deaths as quartan, and 2234 cases and 351 deaths as congestive. According to these figures, intermittent fever, although not a very fatal disease, is too large a source of the sickness of our armies to be overlooked in this little work.

The fluctuations of the disease with regions and seasons are well illustrated by the following table from the circular several times referred to. It will be seen that while these fevers were more common on the Atlantic than on the Pacific border, they were vastly most frequent in the great middle region between the Appalachians and the Rocky Mountains. In each region the

disease pursues an autumnal course, the precise wave varying in each case. Thus September was the maximum month on the Atlantic border, October in the central region, and November on the Pacific.

Monthly Rates of Intermittent Fevers in the Armies of the United States during the year ending June 30th, 1862, expressed in ratio per thousand of mean strength.

1861.

	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Atlantic border.....	10·97	27·96	39·32	34·46	22·08	14·08
Central region	37·27	62·80	53·62	65·27	41·49	29·73
Pacific border.....	5·08	6·65	8·68	18·69	19·80	19·21

1862.

	Jan.	Feb.	March.	April.	May.	June.	For the year.
Atlantic border.	7·87	8·43	7·00	12·01	15·25	16·88	195·94
Central region..	20·94	16·98	18·63	27·41	27·86	26·02	375·34
Pacific border...	9·46	13·27	10·70	5·47	9·53	12·46	151·68

In this chapter it is proposed to present a few considerations with regard to simple intermittents, con-

gestive or pernicious intermittents, and certain of the more obscure but characteristic phenomena of malarial poisoning, which are not unfrequently observed in patients who are not suffering at the time from fever.

SECTION I.

Simple Intermittent Fever—Ague.

It is hardly necessary in the present treatise to present a detailed account of the symptoms of ordinary intermittent fever. The distinct paroxysmal character of the disease, the abrupt chill, and brisk febrile reaction of each paroxysm, its termination in profuse perspiration, and the intermission of comparative health between the paroxysms, are well known to every medical reader. Certain points of interest, however, are worthy of remark. With regard to the comparative frequency of the types of the disease, it has long been known that quotidian is more common than tertian, and this again than the quartan type. According to the statistics above given, the relative frequency is such, that of every 1000 cases it may be anticipated that 573 will be quotidian, 378 tertian, and 49 quartan. According to the same statistics, the mortality of intermittent fever (excluding the congestive form) is very small, being but one death to every 1040 cases. As to the rarer forms, such as quintan, sextan, etc., the statistics of the present war furnish no data.

As an interesting comparative statement, it may

be mentioned that, in the published statistics of the United States army for eighteen years, from 1840 to 1859, the two years of the Mexican war (1847–8) being excluded, 98,237 cases and 33 deaths of intermittent fever are reported. Of these, 51,623 cases were quotidian, 44,857 were tertian, and 1757 were quartan. According to which figures, of every thousand cases of intermittent fever during the eighteen years referred to, 526 were quotidian, 456 tertian, and 18 quartan, and the mortality at the rate of one death to every 2976 cases.

From these statistics it will be perceived that the average mortality of intermittent fever was nearly three times greater during the first year of the present war than it had been during eighteen years of peace, an increase somewhat greater than that indicated by the general statistical results of the mortality of other diseases during the first year of the war, the proportional mortality for all diseases being about two and a half times greater than that of the army during the eighteen years referred to.

In its symptoms and general behavior, intermittent fever, as it has appeared among our troops, has presented no noteworthy peculiarities, except that perhaps it has exhibited a greater degree of obstinacy and a more decided tendency to recur than is usual in civil life. This fact is perhaps quite as much due to the difficulty of causing the soldier in the field to persist in any course of medical treatment, after he is able to return to duty, as to any greater severity of the disease; though as men exposed in camps, with or without tents, to the influence of malarial localities, and to the ordinary atmospheric vicissitudes of tempera-

ture and moisture, might be expected to suffer more severely than those living in comfortable houses, the possibility of a greater energy in the action of the malarial poison is not to be overlooked.

The consequences of prolonged attacks of this fever—enlarged spleen, anæmia, debility, dropsy, disordered liver and disordered bowels—are so precisely similar to the same affections as they occur in individuals who have been exposed to the malarial taint, but who have not suffered from the fever, that all allusion to them may be postponed to the third section of this chapter.

The treatment most generally resorted to has been the administration of large doses of sulphate of quinia. The remedy is given in five-grain doses, repeated so that twenty to twenty-five grains may be taken during the intermission. The administration of the quinia has been sometimes, but not always, preceded by a cathartic. The success of this plan of treatment is well indicated by the exceedingly small mortality from the disease. In obstinate cases the efficiency of the quinia has been increased by combining it with opium, or it has been administered persistently in moderate doses of twelve to fifteen grains daily, continued patiently until the desired result was obtained. In those few cases in which this remedy failed in its effects, arsenic was exhibited in the form of Fowler's solution, five to ten drops being given three times a day, after meals, until the paroxysms disappeared.

In either case the disease was apt to reappear at some definite subsequent period, generally one, two, or four weeks after the last paroxysm; and this par-

ticularly because the soldier, although warned to return at stated periods for prophylactic doses of quinia, generally failed to do so until compelled by the recurrence of the paroxysms.

Sulphate of cinchonia, as a substitute for quinia, was tried to a limited extent by a few surgeons, but did not meet with general favor.

Intermittent fever is a disease the treatment of which is so satisfactory, and so generally appreciated, that although the opportunities offered for observing its phenomena in detail have been extensive during the present war, it appears advisable to pass by the subject of its symptoms, pathology, and treatment with the foregoing brief remarks. The question of the prophylaxis of the disease, however, has given rise to so much controversy that it must be made the subject of more detailed consideration.

The selection of camp sites is a practical point of great importance in connection with the prophylaxis of this disease. These sites are, it is true, in many cases necessarily determined by purely military reasons, which cannot be overruled by any hygienic considerations, and the soldier, in the execution of his duty, must face disease as he faces the bullets of the enemy—with patience and courage. Very often, however, it is possible to make a selection of several adjacent sites, and then it is the duty of the military authorities not to overlook the sanitary point of view, and the medical officers should always be consulted on such occasions, which it is to be feared has been too seldom done. For the considerations which should influence the medical officer under these circumstances, the reader is referred to the section on the malarial influence (Chapter II.).

The troops being exposed in a malarial region, certain precautions may be taken, which will, it is believed, diminish the number attacked by malarial fevers. Thus, the encampment should be well drained with trenches about each tent, and kept as dry and clean as possible; the troops should receive coffee and biscuit immediately after reveille, and before taking exercise. Reveille should not be beat before sunrise, and retreat should not be later than sunset. If the situation with reference to the enemy does not forbid it, large fires should be built in the camp at night, and the men should be directed to keep in their tents as much as possible after sundown. In hot weather, exposure to the sun by drilling, or fatigue duty in the middle of the day should be avoided as much as the exigencies of the service will permit. Exposure to the rain should also be avoided as far as possible. By resorting to these hygienic measures, much can be done to diminish the prevalence of the disease.

But, in addition to these measures, a therapeutical prophylactic has been recommended, and extensively tried during the fall of 1861 and the spring and summer of 1862. This consists in the administration of quinia and whisky as a daily ration to the troops exposed. Half a gill of whisky, in which quinia is dissolved in the proportion of two to four grains to the gill, is served out twice daily to every man in the command. This measure is based upon the issue of wine containing quinia in solution, which has been largely employed by the British troops in the malarial regions of India, a prophylactic measure which has been warmly commended by some of the most experienced British military surgeons.

This plan was first proposed in the fall of 1861, and as the Government seemed unwilling to furnish whisky in sufficient quantities, the Sanitary Commission undertook to supply such surgeons as desired it with the liquor necessary, and in some instances even with the quinia. These issues, although large in themselves, were, however, of course very limited, when compared with the vast size of the armies in the field. The first impression of most surgeons was decidedly in favor of the prophylactic efficiency of the measure; so much so that it was finally decided by the medical department to give the plan a trial, and quinia and whisky were largely distributed during the spring and summer of 1862. The quinia and whisky were sometimes employed together; sometimes the whisky was given alone. Ultimately, however, the practice fell into disuse, and at the present time the quinine-whisky is but little resorted to for prophylactic purposes.

Without entering into an elaborate discussion of this subject, which has excited considerable controversy, it may be stated that a daily whisky ration, in the case of healthy troops, well fed and cared for, and not unreasonably exposed, is not desirable where coffee is so liberally supplied as in our own army. It is bulky, costly, in transportation excludes more important articles, predisposes to habits of intemperance, and diminishes rather than increases the daily consumption of food, upon which of course the soldier must chiefly rely for the maintenance of his energies. These objections are in nowise removed by the combination of quinia with the whisky, and its use there-

fore would only be justifiable if decided prophylactic powers were actually demonstrated to exist.

Unfortunately, experience has shown that quinine-whisky, administered as above described, is far from being a powerful or complete prophylactic measure, and this, as well as the unpleasant taste of the mixture, explains the very general disuse into which the agent has fallen.

There are circumstances, however, under which a whisky ration is exceedingly desirable, and also under which it is advantageous either to combine it with quinia, or at least to administer quinia in conjunction with it. When the troops are exposed to fatiguing duties, such as heavy marches and labors in trenches, or in the construction of fortifications, especially if from difficulty of transportation or other causes the rations are deficient either in quantity or quality, a daily issue of whisky in moderate quantities exercises the most beneficial influence.

If, in addition to the above circumstances, the troops are operating in a malarial region, and general symptoms of malarial poisoning begin to manifest themselves, such as the development among the men of anæmic symptoms, with an icteroid hue of countenance, with the frequent occurrence of intermittents, the use of quinia in conjunction with the whisky may be advantageously resorted to. Surgeon J. H. Brinton, U. S. V., has informed the author that, in the spring of 1862, he caused the distribution of some five hundred barrels of whisky among the troops of General Grant's army, under the above circumstances, with the greatest advantage. He, however, gave the whisky by itself, administering the quinia

separately to those cases only in which the presence of evident malarial phenomena appeared to demand its use.

Surgeon Brinton also caused a general rule to be adopted by the regimental surgeons under his orders, which worked well, and which, as a practical measure, is worthy of consideration. He directed the whisky ration to be administered only to those men who continued to do military duty; finding, as a general rule, that those who were exempted from the fatigues of service, and allowed to repose in hospital, did well without stimulus on the liberal hospital diet allowed, conjoined with the use of quinia and other therapeutic agents, and that the adoption of this rule had the effect of diminishing largely the apparent sick list, by offering to the indolent an inducement to continue at their posts.

There is another objection to the indiscriminate use of quinia and whisky as a preventive agent. The system in time acquires a tolerance of the action of quinia, and when acute malarial affections supervene, as they frequently do, the grand therapeutic agent on which the surgeon chiefly relies is found to have lost its curative power to a great extent.

The general use of quinine-whisky as a preventive of malarial disease is therefore to be regarded as unadvisable, although the issue of a whisky ration, under the particular circumstances above indicated, is beneficial, and quinia should be reserved for employment as a therapeutic measure in the treatment of the actual symptoms of malarial disorder when they appear in individual cases.

SECTION II.

Congestive, or Pernicious Intermittent.

Although, as shown in the preceding remarks, ordinary intermittent fever is a very curable affection, involving no great risk to life, there is a form of the disease which is alarming in its symptoms, dangerous even when the wisest treatment is employed, and exceedingly fatal if proper remedial measures are not resorted to.

This is the disease known generally throughout the malarial regions of the South as congestive fever, and for which Prof. George B. Wood has proposed the designation of pernicious fever. The term congestive fever is highly objectionable, as in no way indicating any characteristic peculiarity of the disease. The same remark applies to the term pernicious, which expresses simply the fatality which this disease shares with many others. Either of these designations, however, prefixed to the term intermittent serves sufficiently to characterize the affection, and as congestion is by no means always the source of danger, the designation pernicious intermittent is perhaps preferable.

Pernicious intermittent is essentially a malarial fever, characterized by the intensity and severity of the cold stage. It is a form of disease which is almost unknown in the Northern and Middle States, and which increases in frequency and severity the farther we proceed to the South.

Symptoms.—The disease may commence abruptly, but most generally begins as an ordinary intermittent fever, the pernicious symptoms not being manifest in the first paroxysm, but developed in one of the subsequent ones. The attack in either case commences with a chill, which is of inordinate severity and duration, and is accompanied by the most alarming prostration. The countenance is of a livid paleness; the features shrunken; the fingers often shriveled as in the collapse of cholera. The tongue and skin are cold, while the patient frequently complains of sensations of intolerable internal heat, and often of intense thirst. Nausea and vomiting, with or without diarrhœa, are frequent and distressing symptoms. The respiration is slow, labored, and sighing; the pulse exceedingly frequent and feeble. There is restlessness and insomnia, but very generally no delirium, the mind remaining clear to the last even in fatal cases. Cramps in the muscles of the extremities frequently occur as in Asiatic cholera. In fact, in severe cases the patient falls into a state of collapse which very closely resembles the collapse of that disease; the debility becomes extreme; the respiration slower and slower; the pulse progressively more frequent and feeble, finally ceasing altogether from the extremities toward the heart, and the patient calmly expires. Generally, however, especially if proper measures of treatment are resorted to, the patient does not perish in the first paroxysm. After from four to six hours reaction sets in; the pulse becomes fuller, stronger, and slower; the respiration more frequent and natural; the skin resumes its natural warmth; the vomiting and diarrhœa are checked, and a slight febrile

reaction is developed, which generally is in no way proportioned in its severity to the intensity of the cold stage. The febrile stage, like that of ordinary intermittents, is followed by an intermission more or less complete, and an opportunity is thus afforded to resort to energetic measures to prevent the recurrence of the paroxysm. If this is neglected, the severe symptoms described usually recur the next day or the next day but one, at about the same hour, as in ordinary quotidian or tertian fevers. In this case the second or third paroxysm is usually fatal, though cases occur in which the patient escapes in spite of neglect, and the disease passes into an intermittent or remittent fever of the usual character.

The above is a brief outline of the most common course of the disease. Certain variations have, however, been noticed, which it is important to describe. Thus, sometimes instead of the unimpaired intellectual condition described as usual, considerable cerebral disturbance exists; there may be drowsiness, stupor, or even coma, occasionally delirium, sometimes convulsions. An exceedingly interesting variety of the affection was observed by the author, during the siege of Yorktown, in a number of cases, and was, he believes, spoken of by many surgeons, both at that time and later in the Peninsular campaign, as spotted fever, being, in some instances at least, confounded with typhus. These cases began abruptly with a chill, followed by prostration and the general symptoms above described as usual in this disease, except that nausea and vomiting were not prominent symptoms, at least in the cases that fell under the observation of the author. The collapse was profound, and

often extremely prolonged, sometimes for more than twelve hours, and the remission that followed was far from complete. Some time during the first or second paroxysm, petechial blotches, of variable size and intensity, made their appearance over the body. The disease was usually of the quotidian type, and very often proved fatal in from twenty-four hours to three days—that is, during the first, second, or third paroxysm. If the patient lived beyond this period, the disease ran the course of severe typho-malarial fever, with variable results.

This affection, concerning which considerable difference of opinion existed at the time, the author was disposed then as now to regard simply as a pernicious remittent, deriving its intensity from the energetic malarial influence of the low, swampy ground on which the army was encamped, an influence which was also manifested in the development of many other forms of malarial disease. The petechial eruption was probably due to the depravation of the blood, produced by the disease operating upon men with constitutions already modified by the prolonged use of camp diet. The cases treated by the author all terminated successfully under the action of large doses of quinia.

Diagnosis.—The diagnosis of pernicious intermittent is of the utmost importance, for unless the disease is recognized in due time, there is little hope that those prompt measures will be resorted to by which alone safety can be secured. Those who have intelligently observed a few cases of this affection will have but little trouble in recognizing it, and these remarks, therefore, are especially addressed to those

who have not yet had that opportunity, but who may encounter the disorder at any time.

As a general rule, whenever, in patients laboring under intermittent fever, violent symptoms of almost any kind—especially symptoms indicative of nervous, digestive, or circulatory disturbance, with great prostration — make their appearance at a period corresponding with one of the febrile paroxysms, the nature of the affection admits of little doubt. When the disease occurs abruptly in a patient previously in good health, the diagnosis is more difficult. Still the suddenness and severity of the attack, the disordered nervous action, the intense prostration occurring in the absence of other assignable causes, the sensation of internal heat with a surface preternaturally cold, and the comparatively sudden termination of all these symptoms in a more or less complete intermission, should enable even a beginner to recognize the nature of the disease. Should any doubt exist, the surgeon should act as if he knew the case to be one of pernicious intermittent; by so doing, no harm will ensue even if he is in error, while if he omits this heroic course and waits for further indications, although the occurrence of a second paroxysm will place the diagnosis beyond a doubt, yet it is then often too late to obtain a successful issue by the remedies in our power.

The affections with which the first paroxysm might be most frequently confounded are, perhaps, severe cholera morbus and Asiatic cholera. From the former pernicious intermittent may be distinguished by the nature of the ejecta, and by the more intense prostration which accompanies it. In cholera morbus, the

matters vomited are generally more or less mixed with bile, and the stools are usually decidedly bilious. In pernicious intermittents, the vomited matters are, at first the food, followed by a thin, watery mucus, mixed occasionally with blood, and much more rarely with bile; while the stools are liquid, watery, brownish or bloody, and but seldom mixed with bile.

From Asiatic cholera the disease may be readily discriminated in the absence of epidemics of that disease, which, as is well known, does not occur sporadically. Even should an epidemic of cholera unhappily coexist, there should, however, be no difficulty in making the distinction, by bearing in mind the peculiar ricewater-like discharges which are characteristic of that disease.

Post-mortem Appearances.—There are no post-mortem appearances which can be regarded as characteristic of this affection. Enlargement and softening of the spleen are generally present as in other cases of fatal malarial disease. Congestion of the meninges of the brain and spinal cord, of the intestinal mucous membrane, of the liver, or of the lungs, is frequently, but not invariably, observed. In addition to these facts, little has been found to throw any light upon the nature of the disease.

Nature of the Affection.—An elaborate discussion of the nature of pernicious intermittent is out of the question in this place. It is to be regarded simply as a malarial fever, in which the severe and dangerous symptoms of the cold stage are due, in part, to the energy of the malarial influence, but in part also to the peculiar susceptibilities of individual cases.

Prognosis.—This disease was formerly exceedingly fatal, and although under the energetic use of sulphate of quinia, which has become the recognized mode of treatment, the mortality has greatly diminished, it is still to be regarded as a most serious affection, requiring a very guarded prognosis. The mortality during the first year of the present war was at the rate of one death to every six patients.

Treatment.—The treatment consists essentially in the use of stimulants and restoratives during the period of prostration, and the prompt administration of large doses of sulphate of quinia so soon as reaction is established. For the first purpose the most energetic measures are required, the whole efforts of the surgeon being addressed to bring about reaction; bottles filled with hot water, or heated bricks wrapped in flannel, should be applied to the lower extremities, sinapisms to the wrists and ankles, or hot mustard pediluvia may be applied. Where the state of the stomach is such that it will retain remedies, opium, combined with capsicum and with sulphate of quinia, may be employed. A pill, composed of half a grain of opium, quarter of a grain of capsicum, and two grains of sulphate of quinia, may be administered every two hours until two or three grains of opium have been given, when the dose of that article should be diminished. Warm, nutritive drinks, such as chicken water or thin beef tea, should also be used if the patient can be persuaded to swallow them. By these simple measures reaction will be hastened; and so soon as the remission or intermission occurs, quinia is to be administered, as hereafter directed. Should the prostration continue, however, no hesitation as to

the use of alcoholic stimulants need be entertained. Brandy or whisky may be freely employed in doses of from half an ounce to an ounce, repeated according to the severity of the case and the previous habits of the patient. Little fear need be felt of the production of excessive reaction; in this disease it is from the severity of the cold stage, and not of the subsequent reaction, that danger is to be anticipated. In prolonged cases, concentrated beef tea or beef essence should be used, in connection with the stimulants employed, in tablespoonful doses, at regular intervals.

A serious impediment to the administration of these remedies occurs, however, in many cases, in consequence of the excessive irritability of stomach, which has already been adverted to. In some cases nothing is retained; food, drink, and medicine, even in the most concentrated form, are promptly rejected. In such cases an attempt should be made to allay the irritability of stomach by the use of opium, or some of the salts of morphia, by sinapisms to the epigastrium, and by small doses of strong coffee which often answers an admirable purpose in such cases.

If the anodyne is not retained by the stomach, it may be used in the form of enema, sixty to a hundred drops of laudanum, with a little starch-water, being thrown into the rectum. It sometimes happens, however, that from the frequent purging or from the irritability of the rectum, which appears to share the excessive sensibility of the whole alimentary track, the enema is not retained. In this case a blister should be made over the epigastrium, and morphia applied hypodermically. As no time must be lost, it

will not do to make this blister in the ordinary mode. It may be promptly produced by strong aqua ammonia, or perhaps, still better, by laying a wet cloth over the epigastrium, and placing upon it for a few seconds a piece of metal, such as a pound weight, for example, heated to the boiling point of water. The cuticle being removed, half a grain of morphia, rubbed up with a little white sugar, may be dusted upon the raw surface, which may then be covered with a piece of muslin spread with cerate.

So soon as reaction is established, the sulphate of quinia is to be administered, to prevent a recurrence of the paroxysm; from fifty to sixty grains of this salt should be given during the intermission. The doses in which it is administered, and the frequency with which they are to be repeated, will depend upon the length of the intermission. It is always safest to act on the supposition that the paroxysm may recur next day, even in cases supervening in the midst of tertian intermittents. The doses should be therefore so graduated that the full quantity may be taken by at least an hour or two before the time next day corresponding to the commencement of the first paroxysm. Five, ten, or even twenty grains may be given at a time in order to effect this object. If the irritability of the stomach continues to be such as to render it doubtful whether the quinia will be retained, it may be combined with morphia. If the stomach obstinately rejects it, it should be administered in solution, as an enema, in doses twice or thrice as large as by the mouth. It has even been recommended to use it hypodermically, but this can only be required in very rare cases.

In the great majority of cases in which the true nature of the disease is recognized during the first paroxysm, and quinia is energetically administered as above described, the second paroxysm either does not occur at all or is greatly moderated, and a repetition of the quinia before the third paroxysm is efficient in putting a check to the disease. As a general rule, fatal cases are either so in the first paroxysm from the overwhelming violence of the attack, or the true nature of the disease not having been recognized, and quinia not having been given at all, or not in sufficient quantities, the second or third paroxysm proves fatal. It is very rarely indeed that, reaction from the first paroxysm having taken place, and quinia having been properly administered, the disease progresses to a fatal termination. But to produce this happy effect, the quinia must be administered in decided doses. The quantity of the drug which would be adequate to check an ordinary intermittent is not sufficient. The extraordinary severity of the disease requires extraordinary energy in the treatment. The quantity above directed will appear to some inordinate, but only to those who are not personally acquainted with the severity of this form of disease and the utter inadequacy of ordinary measures to control it.

SECTION III.

Chronic Malarial Poisoning.

In malarial regions a train of symptoms constituting a peculiar morbid condition is developed to a greater or less degree in the majority of those who are exposed to the influence. These symptoms are more severe in the case of strangers than with the inhabitants of the region, although these latter do not escape. Troops moved from a northern climate to a southern malarial region are peculiarly susceptible, not merely because they are unacclimated, but also because their peculiar mode of life exposes them especially to malarial influences wherever these exist. This malarial cachexia or chronic malarial poisoning is chiefly seen among those who have suffered from prolonged or repeated attacks of intermittent fever; but the same symptoms are observed among others who, although they have been equally exposed to the cause, may have altogether escaped the development of any febrile phenomena.

Among the earliest symptoms of this condition is the development of more or less hepatic disturbance. The bowels become constipated, with loss of appetite, uneasiness, or even tenderness in the right hypochondriac or epigastric region, and the development of a slight icteroid hue of the conjunctiva, or even of the skin. In this condition the patient is said to be bilious. Mild cathartics relieve the symptoms for a time, or they are relieved by a spontaneous diarrhœa;

but they are apt to recur, from time to time, and may even go so far as the development of actual icterus.

In the more advanced state of the affection a peculiar anæmia makes its appearance. The patient, without emaciating, becomes pale and bloodless in aspect, with a yellowish hue of skin, which is quite characteristic. If the blood is examined microscopically, a deficiency of red globules and an increased proportional number of white corpuscles are readily detected. Accompanying this condition, and usually preceding it, a decided enlargement of the spleen can be observed. The organ is sometimes tender on pressure, sometimes the seat of vague uneasy sensations, or even of actual pain, especially after exercise. Percussion shows an increased area of dullness over the region of the spleen by which its increased size can be very satisfactorily estimated. By causing the patient to lie upon his back, with the shoulders raised by pillows and the knees drawn upward, so as to relax the abdominal parietes, the enlarged viscus can often be distinctly felt in the midst of the abdominal contents. Even in slight cases the margin of the spleen can be made out projecting below the ribs; and every transition exists between the condition in which this is just possible and the extreme cases in which the splenic tumor occupies the whole left hypochondriac and lumbar region encroaching upon the epigastric, the umbilical, and left iliac regions.

In the advanced stages of the affection a tendency to dropsical effusions often appears. The most common form is œdema of the lower extremities or gen-

eral anasarca, but simple ascites or ascites complicating anasarca may occur.

This condition may depend upon the mechanical effects of the enlarged spleen, upon the impoverished state of the blood, or may be connected with chronic disorders of the liver or the kidneys developed in the course of the disease.

The train of malarial phenomena thus briefly sketched is very generally complicated in the army with the constitutional conditions resulting from the prolonged use of camp diet; in other words, with a subacute scorbutic tendency indicated by the peculiar tongue, the cardiac irritability, the rheumatic pains, and chronic diarrhœa, characteristic of this condition, and it is among men reduced to this state that camp fevers make their most fatal inroads.

There can be no doubt that the debilitating influence of malarial poisoning acts like other debilitating influences in aggravating the scorbutic tendency, so much so, in fact, that by some writers malarial influences are regarded as among the causes of scurvy.

It is also apparent that men whose constitutions are reduced by the prolonged use of camp diet are especially liable to the influence of the malarial poison. The two conditions therefore react upon each other, and produce a chronic morbid condition, which gives a peculiar complexion to all the diseases of the troops among whom it has been developed, as was observed on a great scale in the armies of the West during the spring and summer of 1862.

In this condition the mental faculties do not escape. A torpor or hebetude of mind is developed, with repugnance to every exertion, whether mental or phys-

ical. Troops suffering under this condition become deficient in morale, and unless decided efforts are made to combat the progress of the affection, the way is paved to great military disasters, as is abundantly proved by the history of European armies.

A tendency to chronic diarrhœa is developed in the majority of these cases as they have occurred in the army. The discharges from the bowels are generally deficient in biliary matters. They are sometimes clay colored, at other times dark and fetid, frequently mixed with considerable quantities of tenacious mucus. In the complex pathological condition which exists, it is often difficult to assign to each morbid influence its share in the production of the phenomena observed, and it is hence not easy to say how far the diarrhœa in question is due to the malarial influence, how far to the scorbutic tendency with which it is complicated.

Disorder of the kidneys frequently complicates the condition under consideration. Scanty, more or less albuminous, urine is often observed, and those cases which occasionally perish with the symptoms of acute uræmic toxæmia, not unfrequently terminate in chronic Bright's disease, with confirmed albuminuria, œdema, or general anasarca, and the whole train of symptoms of that disorder. Malarial neuralgias and rheumatoid complications will be described under the head of pseudo-rheumatism.

Pathological Anatomy.—In fatal cases the morbid appearances observed after death are quite characteristic, and especially the condition of the spleen, the liver, and the kidneys is worthy of consideration.

The *spleen* is generally much enlarged and softened. The size of the enlarged organ varies considerably, from the slightest tumefaction to enormous development. A number of cases in which it exceeded fourteen inches in length, ten in width, and three or four in thickness have been observed by the author, and still greater enlargements have been described by others. In its texture it may be little altered, or so soft and diffluent that the finger may be stirred through it without effort. The Malpighian bodies are very frequently enlarged, and by macerating the organ in a stream of running water they can be readily observed as little cysts, varying in size from that of a pin's head to that of a pea. Abscesses of the spleen, described by many writers on the diseases of tropical climates, have not fallen under the notice of the author.

The *liver* is also very generally enlarged; the distinction between the red and yellow texture abnormally great, giving the organ a "nutmeg" appearance. Sometimes it is yellow, friable, and fatty, at other times bronzed with pigment deposits, occasionally lardaceous or bacony. Microscopical examination generally shows an abnormal abundance of oil globules and granules in the hepatic cells. Pigment deposits, in the shape of reddish, reddish-brown, brownish or greenish-brown granules, grouped around the nuclei of the hepatic cells, are also of frequent occurrence. In the lardaceous cases, cell multiplication of the elements belonging to the scanty, interlobular connective tissue can be readily observed.

The *kidneys* are very generally slightly enlarged and pale; the cortical substance more or less yellowish

in hue; the epithelium of the uriniferous tubules granular. Less frequently, and especially in the cases in which there has been albuminuria and dropsy, cell multiplication in the connective tissue of the matrix of the organ and the various consequent morbid conditions described as fibroid degeneration, lardaceous kidney, cirrhosis of the kidney, etc. are observed. In other cases the kidneys are large, soft, and yellow, from evident fatty degeneration.

In the cases which have been complicated with diarrhœa, the mucous membrane of the intestines is generally found more or less diseased. The details of this subject will, however, be discussed in the chapter on diarrhœa.

Treatment.—Perhaps the most efficient treatment which can be resorted to in the group of cases now under consideration, is to remove the patients from the malarial influences which have produced their disorders to a more healthy climate. This fact ought never to be lost sight of in obstinate cases which refuse to yield to remedies in the malarial region in which they have been developed; and whenever, as continually happens, the overcrowding of the hospitals near the seat of war renders a transfer of patients to the Northern hospitals necessary, all such cases should, if practicable, be selected for the change. In the great majority of instances, however, this expedient is not desirable; to resort to it universally would be to break up any army compelled to operate in a malarial region. Fortunately the therapeutic agents and the hygienic measures within the reach of the surgeons in the field are, in the majority of cases, adequate to check the progress of the affection. By

far the most powerful and successful therapeutic agent in these cases is the sulphate of quinia administered persistently in moderate doses, either alone or combined with some one of the preparations of iron. The quinia should be administered in moderate doses, say two or three grains twice or three times daily, and persisted in until the subsidence of the symptoms. In those cases in which the anæmia is decided, iron should be combined with the quinia—two or three grains of the pill of the carbonate of iron, or one-fourth of a grain of the sulphate, being combined with each dose of quinia. Or ten to fifteen drops of the tincture of the chloride of iron may be administered immediately after taking each dose of quinia. The citrate of iron and quinia is an elegant preparation, well adapted to these cases. It may be given in solution or in pill in the dose of five to ten grains three times daily. As a preparation of iron, it is perhaps unequaled for the cases under consideration; but when it is desired to obtain the effects of quinia in a decided manner, it is best not to rely on this preparation alone, but to give in addition the sulphate of quinia, either in pill or dissolved by means of aromatic sulphuric acid. In case it is considered necessary to resort to other tonics, the mineral acids deserve favorable consideration. Aromatic sulphuric acid, in the dose of ten to fifteen drops three times a day, may be combined with the quinia, and given diluted with a little sweetened water. If there is great torpidity of the liver, nitromuriatic acid is to be preferred It may be given in doses of five to ten drops, diluted with sweetened water. In the selection of any of these remedies the physician must be guided by a careful clinical ex-

amination of each individual case, and the plan of treatment once determined upon should not be hastily abandoned, unless new and important indications subsequently arise. The young physician especially is reminded that in these chronic cases persistent as well as judicious treatment is required, and that constant changes in the course adopted are not merely an indication of a vacillating policy, but that the partial benefit one remedy was beginning to effect may readily be cast away by prematurely abandoning it for another.

In those cases in which after a patient trial quinia is not found to produce an improvement, arsenic, in the shape of Fowler's solution, may be resorted to. It should be given in doses of five drops three times daily, after meals, and, like the quinia, patiently continued. A much larger dose is frequently prescribed, but it is believed that as the arsenical solution can be continued a much longer time in the dose indicated than if larger quantities are taken, the ultimate benefit is greater than when the remedy is given in ten or fifteen drop doses; solid arsenious acid may be substituted for the liquid preparation. (See p. 146.) In either case the effects of the drug require to be carefully watched, and on the appearance of œdema or of gastric uneasiness it should be promptly discontinued.

These therapeutic agents require to be combined with proper hygienic measures, especially with regard to diet and shelter. If the chronic malarial conditions, complicated with incipient scorbutic symptoms, are wide-spread among the troops, as has several times happened in the present war, no effort should be spared to procure supplies of potatoes, onions, and

other fresh vegetables for general issue, and it is the duty of medical officers to make the most earnest representations to commanding generals on this subject. It will generally be found that as the scorbutic phenomena abate under the influence of a proper regimen, the malarial affections with which they are complicated become more amenable to treatment. An issue of whisky as a ration is sometimes also desirable with troops suffering in this manner.

As to shelter much can be done, where troops are encamped long in one place, by the surgeons giving general directions as to the construction of huts, the arrangements, and often even the situations, of camps, etc.; but wherever the troops are not well protected from the weather, the severer cases should promptly be received into the field hospitals, or sent to the general hospitals at the base of operations, for the disease is aggravated by exposure, and treatment will often be found of no avail until the patient is placed under favorable conditions in this respect.

During the progress of the disorder, the various complications and special symptoms must be combated as they arise.

The constipation, gastric irritation, and general bilious condition of the early stages are best combated by mild laxatives and cholagogues. Blue pill is a favorite purgative, with many surgeons, in this condition. It is, however, a dangerous medicine if recklessly resorted to with troops in the field. Whatever may be said of its usefulness in private practice or in hospitals, it should certainly never be resorted to on the march or in bivouac, where the patient may be compelled to sleep on the bare ground, perhaps in the

rain, the very night after having taken the remedy. A full dose of castor oil will very generally answer every purpose in these cases; but where special action on the liver is desired, podophyllin, which has recently been added to the army supply table, may be resorted to; half a grain of this drug may be given combined with a purgative dose of compound extract of colocynth or of rhubarb. Its action will be found similar in many respects to that of blue pill, and without the objections which exist against that article. In larger doses, however, or uncombined, it is too drastic in its effects, and is apt to produce unpleasant griping.

Where it is desired to produce a more permanent effect, the podophyllin may be given in smaller doses, say one-fourth of a grain combined with three grains of rhubarb, to be taken nightly for a week or more. In this condition, also, nitromuriatic acid, before referred to, will be found an advantageous remedy.

For the enlargement of the spleen, the preparations of quinia and iron, directed for the general constitutional condition, are the most valuable remedies, and under their use the size of the organ will usually be observed to diminish gradually; more or less tumefaction nevertheless often persists long after the disappearance of the other symptoms. Where the splenic enlargement is attended with pain, uneasiness, or tenderness in the region of the affected organ, dry cups will be found beneficial, or rubefacients, flying blisters, or other counter-irritants may be resorted to. The local application of tincture of iodine, freely practiced by some surgeons, is of occasional efficacy.

Should dropsy in any form make its appearance, the condition of the kidneys ought at once to be made

an object of investigation. The urine should be examined by heat and nitric acid for the presence of albumen, and if possible, microscopically, with a view to the detection of the casts of the uriniferous tubules so commonly present in chronic renal disease. Should the kidneys prove to be in fault, the tonic course above directed must not be discontinued, but, in addition, mild diuretics, such as the salines or digitalis, should be employed. A large proportion of these cases will terminate favorably under judicious treatment, and especially if the patient can be removed from the malarial influences under which the condition originated.

Should examination prove that the urine is normal, the condition of the liver and the spleen should be carefully investigated, and remedies energetically addressed, on the principle above indicated, to the particular condition found to exist. Even in these cases, however, diuretics will be found useful in relieving, temporarily, the dropsical symptoms. Care should especially be taken, in all these forms of chronic disease, to avoid the use of depressing influences of every kind; drastic cathartics, exhausting diaphoretics, and other debilitating remedies should be carefully avoided. They do more harm by exhausting the already enfeebled vital powers than will be compensated for by any good resulting from their therapeutic effect. The exhausted system needs, above all, rest, nutriment, and the supporting influence of a tonic course.

CHAPTER V.

JAUNDICE.

Epidemic jaundice was a frequent and troublesome, though not a fatal disorder, during the first year of the war, 10,929 cases and 40 deaths having been reported to the Surgeon-General's office during the year. More prevalent upon the Atlantic than on the Pacific slope, it attained its greatest intensity in the central region of the continent, the armies of Generals Grant and Buell suffering far more than any others in the field. Next to these, jaundice was most frequent among the troops in Western Virginia, less so among those in Missouri and in the army of the Potomac. Thus 80 cases of jaundice occurred during the year in Grant's army to every thousand men; in Buell's, during nine months, 65 per thousand; in Western Virginia, during the year, 43 per thousand; in Missouri, 34, and in the army of the Potomac 35 per thousand during the same period. In Minnesota, Kansas, New Mexico, and on the Pacific slope, the disease was comparatively rare.

Jaundice was most prevalent among those armies exposed to the most intense malarial influences, as indicated by the prevalence of malarial fevers; but its monthly fluctuations did not in any way correspond with those of the latter affections, and, contrary to what might be anticipated, in view of the relation

believed to exist between an elevated temperature and hepatic disorder, it was most common in the winter and spring months and rarest in the summer. It was a troublesome and tedious, but not a dangerous affection, the mortality being but one death to every 2732 cases.

Jaundice, as is well known, is a symptom of a variety of pathological conditions, as of various organic diseases of the liver, cirrhosis, tubercle, and cancer, as well as of obstruction of the gall-ducts from any cause, gall-stones for example, of diseases of the duodenum and pancreas, etc.

None of these graver forms of the affection will be discussed in this place, nor will the icteroid hue, sometimes amounting to jaundice, which is common in connection with many fevers, be more than mentioned. The remarks here offered will mainly refer to the epidemic jaundice which has prevailed in the army.

Symptoms.—When this form of jaundice attacks a regiment or an army, it usually appears in a number of cases simultaneously or in close succession like other epidemic disorders, lasts in each case from one to six weeks, or even longer, and then slowly disappears. The appearance of the icteroid hue is, as a rule, preceded by more or less derangement of the general health, often approximating in character to chronic malarial poisoning; sometimes, however, only by a few days of headache, constipation, and malaise, and occasionally the discoloration of conjunctiva and skin is the first noticeable symptom.

The color of the skin may vary from a scarcely noticeable tinge to a deep tawny-orange color; oc-

casionally, especially in scorbutic constitutions, it is greenish. This condition is accompanied by depressed spirits, intellectual torpor, loss of appetite, general debility, and uneasy sensations over the region of the liver and the stomach. Hepatic tenderness is a very variable symptom; enlargement of the liver, as indicated by an increased area of dullness on percussion, is more common. The tongue is generally furred, and the patient complains of a foul taste in his mouth, compared by many to the taste of biliary matters; sometimes there is nausea and vomiting. The stools are usually clay colored, and the bowels constipated, though at times there is diarrhœa. The urine is discolored from the presence of biliary matters. Very often the patient is so debilitated as to be quite unfit for duty, though not usually confined to his bed; at other times, however, he continues to perform service throughout the affection.

After lasting a variable period, the symptoms slowly subside and the patient is gradually restored to health, the mental torpor and debility persisting often some time after the icteroid hue has disappeared.

The first symptom of amendment is generally a change in the color of the stools, which gradually resume their normal appearance.

Cases occasionally occur of a graver character than indicated above, the symptoms of biliary toxæmia being aggravated to stupor or even coma, and such cases at times prove fatal.

Nature of the Affection.—Correct ideas of the present state of our knowledge with regard to the physiology of the hepatic secretion are indispensable to

an intelligent appreciation of the causes and nature of jaundice.

Human bile is composed of coloring matter, the peculiar biliary acids combined with soda, cholesterin, salts (inorganic chiefly) of soda, potassa, and iron, mucus from the gall-bladder, and water; sugar is also at least occasionally present.

The *coloring matter* of the bile is now generally believed to be produced by the destructive metamorphosis of the coloring matter of the blood. Physiologists differ in opinion as to whether this metamorphosis occurs in the liver, or whether the pigment exists preformed in the blood, and is simply excreted by that organ. The weight of evidence inclines to the latter view. The presence of biliary coloring matter in the urine can be detected by the addition of nitric acid, which turns the urine green. Its existence can also be conveniently demonstrated by the addition of a few drops of hydrochloric acid to a small quantity of the urine, which is then set aside for twenty-four hours. The whole of the uric acid is thrown down in a crystallized form, and the crystals in forming take up the coloring matter, and appear under the microscope variously stained with biliary pigment.

The true nature of the *bile acids* has also excited considerable controversy. The view most generally received is that they consist of two conjugate organic acids, glycocholic and taurocholic, combined with soda. This is undoubtedly the true composition of ox bile, on which the majority of analyses have been made; but the experiments of Dalton render it highly improbable that the composition of human bile agrees

precisely with that of the ox. Dr. Dalton has shown that while glycocholate of soda is precipitated with both the acetate and the subacetate of lead, the taurocholate is precepitable by the subacetate only. If, now, to a solution of the bile acids of the ox acetate of lead be added, the glycocholate precipitated, and the mixture filtered, the addition of the subacetate of lead to the filtrate will throw down a fresh precipitate of the taurocholate. If the same operation be performed with the human bile acids, it will be found that after precipitating with the acetate of lead no further precipitate can be obtained with the subacetate, indicating the complete absence of the taurocholate of soda, which is an ingredient in ox bile.

Further accurate observations are needed to demonstrate the true nature of the human bile acids; at present it appears rather probable that there is but a single acid present, closely allied to glycocholic acid, if not identical with it.

No evidence has hitherto been presented sufficient to render it probable that the bile acids are preformed in the blood; they are probably a special product of the liver.

The presence of the bile acids in the urine may be detected with the utmost accuracy by Hoppe's method, which is as follows:—

The urine is boiled with an excess of milk of lime for about half an hour, filtered, the filtrate evaporated to dryness, decomposed with hydrochloric acid, washed with water, and extracted with alcohol. The alcoholic extract contains the bile acids, if any are present. They may readily be detected with Pettenkofer's test,

which consists in adding to the fluid to be tested a drop of a saturated solution of cane sugar, and then cautiously pouring in sulphuric acid, drop by drop; the fluid becomes first cherry red and afterward deep purple, if the bile acids are present.

Cholesterin is a peculiar non-saponifiable fat, which is believed to result chiefly from the destructive metamorphosis of the nerve tissue; it exists preformed in the blood, and is not therefore one of the products of the liver.

Cholesterin, when present in the urine, can readily be recognized in the following simple manner: A small quantity of the urine to be examined is agitated for some minutes with half its bulk of pure ether, allowed to repose, and then the ether, which contains any cholesterin which may be present, is decanted into a watch-glass, and allowed gradually to evaporate. The cholesterin crystallizes in the bottom of the watch-glass, and may be recognized, under the microscope, by its characteristic thin, rhombic plates.

From the foregoing remarks, it appears that there are three characteristic ingredients contained in the bile, each of which, if present in the urine, can readily be recognized by the appropriate tests. These are bile pigment, the biliary acids, and cholesterin; and of these, it appears that while the biliary acids are formed in the liver by the secretory action of that organ, the pigment and cholesterin are not so produced, but exist preformed in the blood.

In jaundice, the biliary matters failing to be thrown off by the liver, accumulate in the blood, and are excreted by the kidneys. For a long while it has been disputed whether the whole of the biliary prin-

ciples are thus excreted, or the coloring matter alone. While it is universally acknowledged that the bile pigment is present in the urine of jaundice, the presence of the bile acids has been variously affirmed and denied by different observers.

To Dr. George Harley, of University College, London, belongs the credit of having first logically reconciled these discrepant observations.* The investigations of this gentleman have shown that, while the bile pigment is invariably present in the urine of jaundice, the bile acids only occur in a certain class of cases—those, namely, in which, from some obstruction in the biliary passages, the bile secreted as usual by the liver accumulates in them and is subsequently reabsorbed into the blood. On the other hand, in jaundice from deficient or suppressed hepatic secretion, the bile acids, which are the special secretion of the liver, not being formed, do not accumulate in the blood, and hence do not pass into the urine. The importance of this fact will be hereafter referred to.

Another contribution of great value has recently been made to the pathology of jaundice, by Dr. Austin Flint, Jr., of New York.† The observations of this investigator indicate that cholesterin accumulates in the blood in cases of jaundice; while the observations of Dr. J. H. Salisbury,‡ made in continuation of Dr. Flint's experiments, show that the accumulated cholesterin is thrown off by the kidneys, and that it can

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* Jaundice; its Pathology and Treatment. By George Harley, M.D. London, 1863.

† Am. Journ. Med. Sciences, October, 1862.

‡ Ibid., January, 1863.

be detected in the urine by the simple test above referred to. Dr. Flint goes, however, still further, and attempts to render it probable that it is to this accumulation of cholesterin in the blood of jaundice that the symptoms of biliary toxæmia are due, and he proposes the term cholesteræmia to designate this condition.

It appears highly probable, from the facts and arguments adduced in Dr. Flint's paper, that this view is a correct one for those cases of jaundice in which the bile acids are absent from the urine, and hence also from the blood. But Dr. Harley has shown that the pure bile acids themselves, if injected into the blood of animals, produce toxæmic symptoms and cause death, and it could hardly happen therefore that they should accumulate in the blood to the extent they sometimes do in jaundice from obstruction, without inducing their poisonous effect in addition to any toxæmic influence exerted by the accumulated cholesterin.

These preliminary statements pave the way for a brief summary of the pathology of the disease.

However manifold the pathological disorders which give rise to jaundice, its proximate cause may be referred to one of two conditions: Either, on the one hand, the secretory action of the liver is diminished or suppressed, and then a form of jaundice arises in which, while the pigment and cholesterin accumulate in the blood and are excreted with the urine, the bile acids do not accumulate in the blood, and are not found in the urinary secretion; or, on the other hand, while the secretory action of the liver is unaltered, the bile is prevented from escaping from the

biliary ducts into the intestine by some mechanical obstruction, such as the presence of a gall-stone or a tumor, and then the biliary matters already formed being reabsorbed into the blood, the bile acids, as well as the pigment and cholesterin, pass into the blood and urine.

There are, then, two forms of jaundice—one from *suppression*, and one from *obstruction;* in both the urine contains pigment and cholesterin, but the bile acids are only found in the urine of jaundice from obstruction. The presence or absence of the bile acids in the urine then affords an accurate method for the differential diagnosis between these two forms of jaundice.

The epidemic jaundice of the army belongs to the category of jaundice from suppression. In the malarial regions in which it has occurred, deficient hepatic secretion is a characteristic phenomenon; carried to a high degree this deficiency produces the form of jaundice under discussion. The precise pathological condition which causes the secretory deficiency has not been thoroughly investigated, from the small mortality of the affection, which has afforded but few opportunities for post-mortem examinations of uncomplicated cases. It appears, however, probable that, although simple congestion of the liver may often cause deficient secretion, and may of itself give rise to jaundice, in the majority of cases a more or less considerable alteration of the hepatic texture is present. In fact, in the post-mortems on those dead from other diseases in these malarial regions, it seldom happens that the liver is found perfectly healthy; the organ is usually more or less enlarged, the yellow substance of the

parenchyma predominating over the red, and microscopical examination shows an unnaturally granular appearance of the hepatic cells, sometimes passing into fatty metamorphosis. This condition is so generally observed in the liver of those dying from various diseases, or even from wounds, in malarial regions, that it is impossible not to connect it more or less with the pathology of jaundice. Of course jaundice from any of the pathological conditions which give rise to it in civil life, may occur in the army, but these conditions are comparatively rare, and the common form is the simple affection above described.

Treatment.—With these views of the pathological nature of epidemic jaundice, the indications of treatment are evident. On the one hand, remedies calculated to promote the hepatic secretion are clearly appropriate, and, on the other, it is desirable to use measures to counteract the malarial influence by which the hepatic torpor was produced.

Prominent among the measures calculated to increase the hepatic secretion, the majority of the text-books place the mercurial preparations, whether given in purgative or alterative doses. Experience, however, shows that when given as a purgative, the power of the mercurial is far less than the extravagant praises bestowed upon it would lead the surgeon to expect; its efficacy is certainly not greater than that of some of the other purgatives which will be presently mentioned, while, if given in alterative doses, it may very generally be pushed to gentle salivation, without producing any decided modification in the icteroid condition. Modern physiological observation, moreover, has rendered it exceedingly doubtful whether mercurial prep-

arations exercise any direct effect in increasing the hepatic secretion. In view of this uncertainty of action, and of the debilitated condition which very generally attends jaundice among troops, it will be found advisable to abstain wholly from the use of mercurials, and to rely upon simpler and less dangerous remedies.

Where constipation exists, the use of gentle laxatives, from time to time, is of course indicated, and among these, combinations containing small quantities of podophyllin are especially to be commended. Podophyllin possesses the property of directly increasing the secretion of bile, and usually in a decided manner. It should not, however, be used alone, as its tendency to gripe then renders it an unpleasant remedy; combined with rhubarb or with compound extract of colocynth, however, it may be safely administered. Half a grain of podophyllin combined with three of compound extract of colocynth, or with five of rhubarb, may be administered, night and morning, until a decided laxative effect is produced. In many cases a single pill will be sufficient to produce a copious bilious evacuation, with a marked amelioration of the symptoms. In others, however, it may be repeated, night and morning, for a number of days, without producing any laxative effect. In this case auxiliary remedies are demanded.

Extract of taraxicum has been highly praised in the same condition, and would be no doubt a valuable remedy, but for the uncertain properties of the article usually obtained. It is hence far less reliable, and in all cases is less efficient than podophyllin.

Castor oil is also an exceedingly desirable remedy

in these cases; where the podophyllin pill above described fails to operate upon the bowels, it is especially indicated. It very often succeeds in producing free bilious passages, with the happiest results.

Purgatives of any kind must, however, be employed in epidemic jaundice with the utmost caution. If too energetically or too frequently administered, they exhaust the already debilitated patient, and, without benefiting the disease for which they are given, may do positive mischief.

There are, however, other remedies which have been found by experience to increase the flow of bile, and which may be given with advantage throughout the progress of the affection. Among these the alkalies may first be mentioned.

Whatever theory of their action may be formed, there can be no doubt of the fact that the alkalies, given in moderate doses, and *before meals*, increase the hepatic secretion. The carbonates and bicarbonates of soda and potassa are the most desirable preparations, especially the former. They may be given in the dose of ten grains, three times a day. Larger doses are not desirable, and appear at times to debilitate the patient without producing any increased effect.

Contradictory as it may appear, the mineral acids also possess an undoubted power to increase the secretions of the liver. They are especially indicated in cases complicated with diarrhœa, and in protracted jaundice with debility. Nitromuriatic acid is, on the whole, preferable, and may be given in ten-drop doses, three times daily, *after meals*. It will be found not merely to exercise a beneficial effect upon the hepatic

function, but to possess considerable power in checking the diarrhœa.

To counteract the malarial influence by which the hepatic torpor was produced, quinia is, on the whole, the most valuable remedy, and may be given alone, or combined with iron. Two to three grains, three times a day, are sufficient. The large doses often persistently employed are unnecessary, if not injurious. Perhaps, on the whole, the most satisfactory treatment of ordinary camp jaundice consists in the continued use of quinia, iron, and a nutritious diet, with an occasional cathartic of podophyllin and colocynth, or of castor oil at bedtime.

In those cases in which hepatic tenderness indicates decided congestion of the liver, dry cups applied to the hypochondriac region, from time to time, will be found desirable.

Of course the treatment above indicated is wholly inappropriate to the form of jaundice which arises from obstruction of the biliary ducts. In that case, to promote the hepatic secretion would merely add to the mischief. Fortunately, even in obscure cases, the presence of the bile acids in the urine of this variety of jaundice affords a ready means of diagnosis. The treatment of the various pathological conditions, which may give rise to obstruction, is of course foreign to the purposes of this treatise.

CHAPTER VI.

CAMP DIARRHŒA.

UNDER the designation of camp diarrhœa may be included all the protean forms of looseness of the bowels observed in the army during the present war. Dysenteric forms are included as well as ordinary diarrhœa; but although differing in many particulars, the sharp distinctions between diarrhœa and dysentery observed in civil practice have not obtained, especially in the chronic forms of the disorder. (See Section IV.)

Diarrhœa and dysentery have been the most frequent of all camp diseases, and although not nearly so fatal as fevers, have caused a very large mortality: 215,214 cases of these affections, under the several heads of diarrhœa acuta and chronica, dysenteria acuta and chronica, were reported to the Surgeon-General's office during the year terminating June 30th, 1862, and of this number 1194 are reported to have died. The number of deaths thus represented is probably considerably less than the real number of fatal cases, and this for two reasons: on the one hand, various intercurrent affections not unfrequently carry off patients laboring under these diseases, as will be seen in the sequel, and in this case the death is generally reported under the head of the disease which was the proxi-

mate cause of death; on the other hand, large numbers of patients laboring under chronic diarrhœa have been discharged the service on surgeons' certificate of disability, and although it is probable that a considerable number of these cases ultimately terminated fatally, no reports of the issue have been received at the Surgeon-General's office. The disease has been most common in the summer months, and especially in July, August, and September, but no season of the year has been exempt. Its frequency has, moreover, varied greatly in different localities. In the valley of the Mississippi, and on its tributaries, as well as on the Gulf coast, this class of disorders has proved both more frequent and more fatal than on either the Atlantic or Pacific borders; and of the latter regions the Atlantic coast has suffered most from the complaint.

The table on the next page contrasts the course of the disorder, during the first year of the war, in these several regions. As for its mortality, the statistics show one death to every 1159 cases for the Pacific coast, one to every 482·8 on the Atlantic, and one to every 103·8 in the central region.

Monthly Rates of Diarrhœa and Dysentery in the Armies of the United States during the year ending June 30, 1862, *expressed in ratio per thousand of mean strength.*

1861.

	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Atlantic border.....	168·23	116·29	70·80	62·66	46·06	28·54
Central region	88·93	127·72	93·34	92·50	69·63	61·27
Pacific border.....	29·41	40·67	33·12	32·00	35·92	20·12

1862.

	Jan.	Feb.	March.	April.	May.	June.	For the year.
Atlantic border.	23·20	22·20	35·22	67·20	70·92	87·06	646·01
Central region..	68·00	54·13	68·66	105·32	97·07	83·02	994·77
Pacific border...	18·07	20·02	23·87	18·97	29·09	30·25	319·64

This table shows the frequency of the disorder to have been greater than that of any other affection, and on this account alone it would demand the earnest consideration of the military surgeon.

As actually manifested, diarrhœa has been so manifold in its phenomena that no general description will

answer, and a representation of the facts will be best attained by a brief outline of some of the principal forms of the disease. In so doing, however, there is no intention to make arbitrary distinctions, or to set up boundary lines which have no existence in nature; it must be carefully remembered that the several forms described are so intimately associated, often in the same case, that any classification must be regarded as more or less artificial, and is only justified by convenience. With this understanding, *simple diarrhœa*, *acute enteritis*, *acute dysentery* (colitis), and *chronic diarrhœa*, which may or may not be *dysenteric* (entero-colitis), will be separately discussed.

SECTION I.

Simple Diarrhœa.

Simple diarrhœa is most frequently observed during the summer months, and may result from any causes capable of producing irritation of the intestinal mucous membrane; frequently it is connected with some indiscretion of food or drink. A common cause is the indiscreet use of unripe fruit or uncooked vegetables. A regiment or brigade, previously healthy, encamps in the neighborhood of orchards or vegetable gardens, and in a few days hundreds of cases of slight diarrhœa make their appearance; or a sudden supply of sutlers' wares, such as pies, cakes, spruce beer, and the like, is followed by large numbers of cases among the purchasers. It also not unfrequently follows a liberal

supply of fresh meat among troops who for some time have been fed upon salt provisions only, or may be the result of the imperfect cooking of the ordinary ration. A change of water is also frequently followed by an outbreak of the disorder. Troops leaving an encampment where good soft water has been abundant, and moving into a region where the springs are more or less impregnated with lime salts, especially where these are combined with sulphates or carbonates of magnesia, often suffer largely from the complaint.

This class of causes is worthy of more study than is usually bestowed upon it, and especially is it of importance in the case of troops operating in the great central basin between the Appalachians and the Rocky Mountains and south of the latitude of the Ohio River.

In this extensive region, embracing especially the theater of war in Western Virginia, Kentucky, Tennessee, Northern Alabama and Mississippi, Southern Missouri, Arkansas, Kansas, and New Mexico, certain important geological conditions exist which are worthy of careful consideration by the practical physician. In this large basin, the great northern drift, which so generally covers the surface formations of the plains and rolling country of Europe and the Northern United States, does not exist to any extent, and the soil reposes directly on the special surface rocks, with the exception of the alluvial regions connected with the water-courses. As a result, the surface water obtained from wells and springs is much more decidedly influenced by the geological structure of the region than it could be expected to be where it

filters through the superincumbent drift, and hence arises the fact that springs located very close to each other, but rising from strata of different character, may differ most materially in their chemical constituents and in their effects upon health. Of two regiments encamped, side by side, on the opposite slopes of the same hill, or on the opposite sides of the same valley, drawing water from springs less than a quarter of a mile apart, one may obtain pure, good soft water, and be almost free from disease, while the other may be supplied with water charged with lime and magnesia, and suffer most extensively from diarrhœa. The importance of this fact, as bearing upon the selection of camp sites, cannot be overestimated.

Sometimes the drinking water is free from injurious mineral substances, but charged with organic impurities, especially in the shape of decomposing vegetable matters. This is particularly the case with the water of swampy regions, and frequently gives rise to disorders of the bowels. During the siege of Yorktown, for example, and also on the banks of the Chickahominy, much of the drinking water used by the troops was obtained by sinking shallow holes, two to four feet deep, in the neighborhood of swamp pools, and collecting the water which speedily accumulated in these depressions. Too often even the surface water of the pools themselves was used as a beverage. In both cases the liquid obtained was offensive to the taste and rich in putrefying organic matters; numerous cases of diarrhœa resulted from this source. The same conditions have also obtained in many other situations. In this connection may be mentioned the diarrhœa which occurred in the army

of the West while at Pittsburg Landing. A part of this was attributed by many eye-witnesses to drinking the water of the Tennessee River, which at this point is said to be still charged with decomposing animal matters derived from the muscle shoals higher up on the stream. It was more probably due to the impregnation of the water with the magnesian limestones which form the river bed; but whatever the cause, when the army moved forward against Corinth, and left the river behind it, a marked diminution in the amount of diarrhœa occurred.

Another cause of the disease is to be found in the mere exposure of soldiers to the heat of summer, and especially marching or drilling in the hot sun is apt to be followed by numerous cases of diarrhœa, and this happens alike with new troops and with veterans. Hence the frequency of the disorder in hot regions and in the summer season. Of the vast number of cases of diarrhœa reported during the summer of 1861, before those profound constitutional modifications had set in among the troops, which are characteristic of camp life, a great number were attributable to this cause.

But diarrhœa occurs in hot weather from many other causes than the direct action of the solar rays. Among the most frequent may be mentioned the sudden checking of the perspiration. After a fatiguing march, or even after the ordinary labors of the day, the troops throw themselves upon the ground for repose; the nights are frequently very cool, even in the most sultry regions of the United States, and the sudden diminution of the cutaneous secretions thus induced gives rise to numerous cases.

Indeed, no view of the etiology of diarrhœa can be complete which does not take into consideration

the intimate relations existing between the skin and the mucous membrane of the bowels, a relation of such a character that any interference with the secretions of the cutaneous surface is sure to be followed by disorder of the intestinal functions; and hence exposure to cold and dampness, especially during cold, damp spells in the warm months, is frequently followed by acute diarrhœa. Sleeping on the damp ground, or in wet clothes, and picket duty or marching in rainy weather, are common causes of the disease. These relations are, indeed, so generally understood that a practical recommendation has been based upon them. It has been generally advised that the soldier should wear flannel next the skin, in the hot as well as in the cold months, and some have gone even so far as to suggest the use of a flannel belly-bandage as an additional article of dress, with a special view to the prevention of summer diarrhœa. There can be no doubt that these recommendations possess a certain degree of practical value.

Fatigue from excessive exertion of any kind is another frequent cause of the complaint; and there can be no doubt that emotions of a depressing character conduce to its production.

Hepatic disorder is also a common condition giving rise to diarrhœa in the summer season and in warm climates. The effect of heat upon the liver is well known, and there can be no doubt that derangements in the quality and quantity of the biliary secretion are the proximate cause of very many cases.

Symptoms.—This form of diarrhœa very frequently begins as a mere looseness of the bowels, without any accompanying constitutional symptoms, and, after lasting a few days, subsides spontaneously. Such attacks

continually occur and terminate without the necessity of calling upon the surgeon for aid.

In more severe cases more or less general disturbance usually accompanies the development of the disease. The patient often, after several days' constipation, with headache and loss of appetite, experiences a peculiar sense of nausea, with uneasiness in the abdomen, attended by lassitude, or debility, with occasional dimness of vision and dizziness or swimming of the head. Sometimes a slight febrile reaction is developed. After a short time griping pains of increasing intensity are felt in the umbilical region, which are followed by a copious fecal discharge. This usually produces some relief, but the symptoms gradually recur, to be again relieved by a second discharge. The evacuations may recur as often as every fifteen minutes or even more frequently, or they may take place but once or twice a day. The patient is often much prostrated, so as to be unable to march for the first few days. He may even suffer for that period from a more or less decided fever, but this usually subsides in two or three days, and he gradually recovers his strength, although the looseness may continue for some little time.

The febrile reaction is sometimes preceded by a chill, and is usually characterized by a slightly furred tongue, an accelerated pulse, with loss of appetite, and sometimes with nausea and vomiting. After the fever has subsided, the appetite returns more or less completely, but a furred tongue and a slightly accelerated pulse, with more or less pallor of countenance, generally continue throughout the attack.

As a rule, the evacuations are copious and liquid, but of fecal odor and appearance. The first passage is often in part of natural consistence, the latter portion of the discharge being, however, liquid, or even thin and watery.

The stools vary from the consistence of thick gruel to a liquid, comparable only to dirty water. In color they may be natural, or clay colored, of various shades of yellow or yellowish brown, or mixed with blood. Examination will often show in them undigested fragments of the food. Bits of scarcely altered meat, the husks of peas or beans, pieces of apple-peel, the seeds of fruits, and many similar articles can often be detected on a superficial examination with the naked eye, and microscopical investigation will show a much larger variety of minute fragments of a similar nature. These fragments, it may be observed, consist not merely of those substances which are insoluble in the digestive juices, and hence are ordinarily voided by stool, but of matters which in the healthy state are readily digested, and are not observed in the normal fecal evacuations: such as unaltered muscular fibers, vegetable cells still containing their starch granules, and the like. Besides these objects, intestinal epithelium in considerable quantities, sometimes mucus and blood corpuscles, with crystals of the ammoniomagnesian phosphates and of the oxalate of lime, may be observed. A careful micro-chemical investigation of these discharges is, however, yet a desideratum.

Prognosis.—The vast majority of these cases of diarrhœa recover, if properly treated; occasionally, however, severe attacks may terminate in fatal en-

teritis, may cause death by exhaustion, or may terminate in chronic diarrhœa.

Nature.—This form of diarrhœa is to be regarded as usually the result of irritation of the intestinal mucous membrane, produced by the ingestion of improper food, or any of the causes above mentioned, and expressing itself in increased secretion throughout the intestinal tract. The irritation may even amount to inflammation, usually of the mucous membrane of the small intestines, when the disease falls into the category of acute enteritis described in the next section. The diarrhœa produced by the use of limestone or magnesian water is essentially similar to that produced by the therapeutic action of saline cathartics. In the form which follows exposure to heat, the intestinal irritation is probably caused by congestion of the intestinal blood-vessels, resulting from the disturbance of the cutaneous circulation. Opportunities for post-mortem examinations occur but rarely. They reveal little that bears upon the nature of the disease, except congestion of the intestinal vessels of variable intensity.

Treatment.—The administration of a brisk but unirritating cathartic to empty the alimentary tract of all indigestible matters is the first and most important indication in the treatment of these cases. Castor oil is perhaps the most desirable agent when the patient will take it without effort; but it should not be forced upon a patient who feels a decided antipathy to it, lest nausea and vomiting be provoked. In this case sulphate of magnesia, pills of compound extract of colocynth, combined with a small quantity of podophyllin, compound rhubarb pills, or any similar

purgative should be employed. Whichever of these agents is resorted to, should be given in full dose, with the object of producing a thorough evacuation of the alimentary canal. In cases of any severity, the patient should be put to bed, and kept at rest. His food should be of the simplest kind, and farinaceous articles, such as boiled rice, cracker-panada, toast and water, barley-water, and the like are to be preferred. Cold water should not be denied, if desired by the patient, but should be given in limited quantities. If there is much griping or abdominal pain, thirty drops of laudanum or an opium pill may be combined with the cathartic, or given subsequently to it. This treatment will suffice in most cases to conduct the case to a favorable issue; but should the diarrhœa continue more than a day or two, some simple astringent may be resorted to. The chalk mixture of the United States Pharmacopœia, pills of opium and tannic acid, or of opium and acetate of lead, tincture of kino, etc. may be used to advantage under these circumstances. In the same condition capsicum is frequently a valuable remedy; it may be given in pill, with camphor and small quantities of opium. A pill containing half a grain each of camphor and capsicum, with the sixth of a grain of opium, may be given every two hours.

The slightest cases do not even require the mild medication above indicated; where there is no fever, and the patient, though disturbed in his bowels, is still able to attend to his ordinary avocations, moderate doses of tincture of ginger, or of tincture of lavender, with or without a small quantity of paregoric, will often be sufficient to check the disease.

SECTION II.

Acute Enteritis.

Any of the causes productive of the simple form of diarrhœa described in the last section, acting with a higher degree of violence, or in individuals in a susceptible condition, may produce true inflammation of the mucous membrane of the small intestines instead of mere irritation. Indiscretions of diet, the action of saline drinking water, and exposures to heat or cold, particularly such exposure as results from sleeping on the damp ground at night, after fatiguing exercise during the heat of the day, are therefore among the chief causes of the disease.

Symptoms.—In the general course of symptoms, this form of diarrhœa closely resembles the last, except that it is more severe. It is, in fact, to be regarded as simply a higher degree of the same disease. Commencing in the same manner, with abdominal uneasiness, griping and colicky pains, with liquid evacuations, and accompanied by more or less constitutional disturbance, the existence of enteritis is usually soon indicated by the greater severity of the local phenomena. The paroxysmal pain becomes more or less persistent, and is often exceedingly severe. A variable amount of tenderness upon pressure is also developed, which is worthy of notice as a diagnostic symptom. The tenderness is slight compared with that of peritonitis, but is often severe enough to cause considerable suffering, and even when not otherwise

noticeable can almost always be observed if firm pressure is made. The most common seats of tenderness are the umbilical and the right iliac region. Fever is much more uniformly present than in simple irritative diarrhœa, being seldom entirely absent in well-marked cases. Not unfrequently a chill, followed by fever, precedes by several hours, or even days, the development of the local symptoms. The discharges from the bowels do not differ essentially from those described in the last section, except that microscopic examination usually detects, in addition to the forms there described, considerable numbers of round granular cells, $\frac{1}{2800}$th of an inch in their average diameter, with one to three nuclei, which, whether it be considered preferable, under these circumstances, to name them mucus corpuscles or pus corpuscles, are to be regarded as evidences of inflammation of the mucous surface. Blood corpuscles are also observed more frequently and in greater abundance than in irritative diarrhœa.

In favorable cases, the fever begins to decline in the course of from three to ten days, the abdominal pain and tenderness gradually disappear, and a simple looseness of the bowels remains, from which the patient rapidly recovers unless some new exposure or indiscretion produces a relapse. This desirable issue occurs in the majority of cases if properly treated and under good hygienic conditions. Occasionally, however, the disease does not yield to treatment. It may persist, and pass into a chronic form, eventually terminating in one or another of the varieties of chronic diarrhœa hereafter to be described; or, instead, it may run rapidly on to a fatal issue. In the latter

case, the abdominal pain and tenderness increase, the febrile action assumes an adynamic character, the pulse becomes frequent and feeble, the mind wanders, delirium sets in, the tongue becomes dry and red, the evacuations from the bowels exceedingly frequent, and death terminates the scene.

Icterus and partial or complete suppression of urine are occasional complications of this severer form of the disease.

Pathological Anatomy.—The mucous membrane of the small intestine, and especially of the ileum, is generally found altered in both texture and color. It is softened, and often thickened; it may be bright red, dark red, reddish brown, greenish brown, or slate colored, in accordance with the severity and duration of the disease. The blood-vessels of the intestine are congested, often gorged with dark blood. This condition is best observed by drying a piece of the intestine after carefully spreading it out on a plate of glass, and then holding it between the eye and the light. Occasionally the enlargement, even the ulceration of the closed follicles, characteristic of the variety of diarrhœa described in the next section, may be observed in cases the symptoms of which do not differ in any respect from those described above. The inflammatory condition described is usually limited to the ileum, but it may extend through the jejunum and duodenum, and even may involve the stomach (gastro-enteritis). On the other hand, the colon may be more or less implicated. The condition of the mucous membrane in these regions does not differ materially from that of the ileum, except that it is usually less intensely affected.

Treatment.—In ordinary cases, the treatment is very similar to that directed in the last section. The patient should be kept in bed, his diet limited during the first few days to demulcent drinks, such as barley-water, rice-water, toast-water, and gum-water; toast and tea in small quantities may be ventured upon if craved, but should not be pressed upon the attention of the patient. A brisk cathartic should be given at the beginning; it serves to remove not only any irritating food, but the secretions of the diseased intestine, which may themselves prove a source of irritation. Castor oil, sulphate of magnesia, magnesia, rhubarb, or pills of the compound extract of colocynth, combined with half a grain of podophyllin, may be used for this purpose; drastic or irritating cathartics should of course be avoided.

If there is much febrile reaction, mild diaphoretics should be employed, such as spiritus mindereri, or the neutral mixture, with which digitalis or aconite may be cautiously combined to control the frequency of pulse.

Warm fomentations should be applied to the abdomen, with a view to alleviating the pain, or sinapisms may be employed for the same purpose, followed by fomentations after their removal. Considerable relief may also be obtained by the application of dry cups.

Opiates are very generally desirable from an early period of the disease. Laudanum may be combined with the castor oil or other cathartic first administered; subsequently some preparation of opium will be required during the day to allay pain, and at night to procure sleep. Dover's powder, if it does not irritate the stomach, is probably the best preparation for this

purpose; it may be given in two-grain doses every two or three hours, according to the urgency of the symptoms. At bedtime, ten to fifteen grains may be given to procure sleep. As the pain and abdominal tenderness subside, the opiate should be gradually discontinued, and some simple astringent may be substituted, if the diarrhœa still continues after the subsidence of the febrile reaction and abdominal tenderness. After the first few days of the disease, a diet more nutritious than that above indicated should be allowed. Farinaceous food, boiled rice, panada, rice flour, farina, soaked crackers, toast and tea may be moderately used. In the severer form, when adynamic symptoms make their appearance, milk, animal broths, beef tea or beef essence should be administered, and alcoholic stimulants may be resorted to without hesitation, if indicated by the condition of the patient.

Mercurials have been very generally employed in the treatment of enteritis in civil life. Without discussing the propriety of this course in ordinary cases, under the circumstances encountered in private practice, the remedy is certainly objectionable in the treatment of this disease in the army. In the first place, it is not necessary, for the majority of cases recover quite as rapidly without its use as where it is employed; in the next place, like all debilitating remedies, it increases the tendency to adynamic phenomena, a tendency which is already sufficiently marked. Should, however, the personal experience of the surgeon, or the influence of his previous education induce him to administer small doses of blue pill or of calomel, with the ipecacuanha and

opium, the effect of the remedy should be carefully watched, and it should be promptly suspended the moment the gums give the slightest evidence of the mercurial impression.

SECTION III.

Acute Dysentery.

Simple cases of ordinary acute dysentery have been common enough in the army. They have, however, as a general rule, been very mild. Of 32,237 cases reported prior to June 30, 1862, but 347 died. The malignant dysentery of European armies has not yet made its appearance among our troops.

Any of the causes capable of producing acute enteritis may give rise to dysentery with those who are susceptible. Indigestible food, unhealthy water, exposure to heat, sleeping on the damp ground, changes of temperature, and other causes already specified in detail, may give rise to this disorder. Malarial influence is a potent predisposing cause, and the disorder is hence most frequent in malarial regions and during the prevalence of other forms of malarial disease. A scorbutic habit, such as usually occurs among troops in campaigns, is also an important predisposing cause, and when developed into actual scurvy has given rise in European armies to the most formidable and fatal variety of the disease.

Symptoms.—As observed in our own army, dysentery very frequently begins with a chill, followed

by fever. Simultaneously, at some subsequent period, or even prior to the development of the fever, griping pains in the abdomen occur, attended by discharges which are at first feculent. The abdominal symptoms differ from those of enteritis both in the character of the pain and the nature of the discharges.

Besides the griping pains in the abdomen, which are technically designated *tormina*, painful straining at stool, with frequent desire to evacuate the bowels, is a characteristic symptom. These efforts, which are not relieved by the scanty discharges, are sometimes so severe as to induce prolapsus ani. To this continuous and painful effort on the part of the lower bowel, the designation *tenesmus* is applied. It is one of the most characteristic symptoms of genuine dysentery.

The stools, at first feculent, speedily become thin, mucous, and bloody. They are exceedingly scanty and frequent; seldom fewer than ten to fifteen in the twenty-four hours, they may even become much more frequent, the patient being seldom free from the painful effort.

The stools not unfrequently contain hard, rounded balls of feces, or *scybala*, which vary from the size of a bullet to that of a walnut, and are generally coated with bloody mucus. Scybala are, however, often absent throughout the whole case. The characteristic stools of dysentery are scanty, composed of a little thin mucus, mingled with blood, and in the latter stages with pus. In extremely adynamic cases they become dark and offensive, resembling the liquid which exudes from putrid meat.

When the disease is fully developed, more or less

tenderness on pressure will usually be found to exist in the course of the descending colon and sigmoid flexure; sometimes even of the transverse and ascending colon. If the inflammation extends also to the small intestines, the local symptoms of enteritis are superadded.

The febrile reaction is of an adynamic character. The pulse is frequent and feeble, the heat of skin marked, the tongue coated at first with a whitish fur, but soon manifesting a disposition to become dry and brown. The secretions generally are diminished, the urine becomes scanty and high colored. There is generally more or less nervous disturbance, but delirium is not usually present during the earlier stages of the disorder.

In favorable cases, and these are by far the most frequent, the disease attains its greatest intensity in the course of a week or ten days, after which all the symptoms gradually decline. The pulse becomes fuller and less frequent, the stools fewer and more natural, the fever diminishes, the secretions are gradually restored, and the patient ultimately recovers.

In less fortunate cases, however, the symptoms continue unabated. The fever assumes a decidedly typhoid character, sordes collect about the gums and teeth, the dejecta become exceedingly offensive, hemorrhages from the bowels occur, a low muttering delirium sets in, and the patient gradually sinks.

In those who have been exposed to malarial influences, the disease occasionally assumes a decidedly periodic character, paroxysms of increased violence occurring at a stated period, daily or every other day.

Far more frequent is the presence of marked symp-

toms of hepatic disorder. There is tenderness in the right hypochondriac region, with an increased area of hepatic dullness; the complexion is more or less tinged from the presence of biliary matters in the blood, and the urine is stained with bile.

In some cases, there is decided jaundice, nausea and vomiting, with cerebral disturbance from hepatic toxæmia. The accumulated biliary matters in the blood may even induce a fatal termination, independently of the severity of the dysenteric affection. Between this formidable variety, and cases in which there exists merely a slight yellowness of conjunctiva, without any other hepatic symptom, all possible transitions exist. Hepatic abscess, so common in the dysentery of the British troops in the East Indies, is exceedingly rare in our own army.

Cases presenting the symptoms of biliary disorder, thus briefly sketched, are sometimes designated bilious dysentery; they are to be regarded as much more formidable than uncomplicated cases.

In the great encampments of other armies, coincident with the prevalence of marked scorbutic disease, a form of dysentery has often prevailed which is far more severe than the affection has as yet proved in the present war.

In these epidemics, the patient who has previously suffered more or less from scorbutic symptoms is suddenly prostrated with nausea and vomiting, combined with abdominal symptoms of a violent dysenteric character. The pulse is extremely frequent, small, and irregular; the tongue dry, cracked, brown or black; the urine scanty or suppressed; the stools dark and fetid; muttering delirium sets in, and pe-

techial spots frequently make their appearance. Occasionally there is jaundice.

This form of disease is very often fatal in the course of a few days, sometimes even within the first twenty-four hours. Happily this terrible form of adynamic dysentery has not as yet appeared among our troops.

As it has hitherto manifested itself during the present war, dysentery has been a comparatively manageable complaint; the figures quoted at the commencement of this section represent the deaths as only about one per thousand of the cases. Nevertheless, not unfrequently the disease proves intractable, and passes gradually into chronic dysentery, or into the peculiar chronic diarrhœa which will be described in the next section.

Pathological Anatomy.—In fatal cases of acute dysentery more or less decided alteration of the mucous membrane of the colon and rectum is always present. It is more or less discolored, thickened, and softened. Frequently dark red or brownish in hue, it assumes, in more protracted cases, the slate-gray or greenish color, which will be described in the next section. Ulcers of variable extent are not uncommon. Sometimes even gangrene of a portion of the mucous membrane occurs, and large sloughs may be thrown off. In some cases the mucous surface is covered with pasty layers of yellowish, greenish, or brownish croupous lymph, and tubular casts of the lower bowel formed of this material occasionally appear in the stools. More or less enlargement and softening of the mesenteric glands are often present. The liver is almost always modified; frequently enlarged and con-

gested, it is occasionally diminished in size, and almost always exhibits more or less fatty change.

Treatment.—In the commencement of a case of acute dysentery, the most efficient remedy is a mild but thorough cathartic. Castor oil, with which a few drops of laudanum may be combined, is one of the best. But sulphate of magnesia, pills of podophyllin and extract of colocynth, or rhubarb, alone or combined with podophyllin, will answer the indication. Purgatives, however, are not to be regarded as a curative measure. They act simply by relieving the alimentary canal of any contents which may serve to irritate the diseased mucous membrane. The bowels once thoroughly cleansed, purgatives are no longer admissible; they do not modify favorably the progress of the disease, and increase the prostration which usually exists.

The administration of the cathartic may be followed, if there is much pain and restlessness, by a full dose of Dover's powder at night, for the purpose of producing sleep. Very often these simple measures, combined with rest in bed and appropriate diet, will be sufficient to relieve the attack. If, however, the disease continue, and the tormina is severe, small doses of Dover's powder may be used, from time to time, with the view to moderate the pain; two to three grains may be given every two, four, or six hours, according to the severity of the complaint. If the febrile action is severe, it may be moderated by the use of the saline diaphoretics, with which digitalis may be combined, for the purpose of controlling the pulse.

If, after the lapse of a few days, the disease fails

to yield to this simple treatment, the mineral astringents may be advantageously substituted.

Acetate of lead enjoys a large reputation in this condition. It may be given in pill, alone or combined with opium. The dose is half a grain to a grain every two hours. Care should be taken not to push the remedy too far, or symptoms of lead poisoning will be induced. After from fifty grains to a drachm have been administered, the remedy should always be discontinued.

Sulphate of copper is another valuable remedy. The dose is one-twelfth to one-eighth of a grain, every two hours, combined with opium.

Hope's camphor mixture, the subnitrate of bismuth, and the mineral acids may also be advantageously employed, alone or combined with opium, in the same manner as will hereafter be described in connection with chronic diarrhœa.

The use of *opium* in this complaint is to be regarded as limited chiefly to two simple indications. It is to be employed to relieve pain and to procure sleep. For the first purpose it is to be given in small and repeated doses, combined with whatever other medicament may be deemed advisable; for the second it is to be administered in full dose at bedtime. Opiates are not to be regarded as specific or curative agents. It is true, they control the frequency of the stools, but they may do so to a marked extent without exerting any favorable effect upon the progress of the disease.

So soon as adynamic symptoms make their appearance, *alcoholic stimulants* are indicated. The general principles which should guide their administration

are precisely the same as those which regulate their use in the various forms of fever and diarrhœa described in this work, and need not therefore be repeated in this place.

While these general measures are resorted to, the local treatment of the disease must not be neglected. In the early stages of the disease, sinapisms, followed by warm fomentations, and the copious use of dry cups, will afford considerable relief. Leeches or cups have been highly lauded in most of the books, but are unnecessary, and sometimes even positively injurious in the dysenteries which have prevailed in the army. By far the most important local measure, however, consists in the judicious employment of appropriate enemata. For the first few days of the disease anodyne enemata are most desirable. Sixty drops of laudanum, mixed with a little starch-water, makes perhaps the most satisfactory preparation. It may be repeated twice or even three times a day if the symptoms warrant it. The quantity of laudanum employed in this manner should always be carefully borne in mind by the physician in regulating the administration of opiates by the mouth. During the same early period, simple lavements of cold water are often very soothing, and followed by the best results.

After the first few days, advantage will accrue from the employment of the mineral astringents, in the form of enemata as well as by the mouth. The sulphate of copper, sulphate of zinc, or nitrate of silver, in the dose of from two to ten grains to the ounce of water, may be advantageously employed for this purpose; the injection being repeated from twice to three times daily.

The *diet* requires careful management. During the

first few days of violent attacks it should be strictly limited. Mucilaginous or acidulated drinks, with a small quantity of boiled rice, is all that it is desirable to allow. Small quantities of ice-water may be permitted to allay thirst, or broken ice may be used to cool the parched mouth. As the disease progresses, however, a more generous diet becomes necessary; and perhaps no article is more generally applicable than milk, either alone, boiled with rice, or prepared as wine-whey or milk-punch.

In the more prostrate cases beef tea or beef essence must be resorted to, and the whole supporting course already outlined in cases of typho-malarial fever may become desirable.

The effect of the diet upon the bowels should, however, be carefully watched, and any article which appears to increase the local symptoms should be promptly discontinued.

Such is the general course of treatment which will be found most satisfactory in the ordinary form of camp dysentery, as it has prevailed in the army. The special modifications of the disease will of course necessitate appropriate changes in the plan of treatment. Thus, in those cases which assume a remittent or intermittent form, advantage will accrue from antiperiodic doses of quinia, or from the use of Fowler's solution.

In the cases in which the hepatic tenderness and icteroid hue are marked, benefit will be derived from the use of occasional laxatives to relieve the hepatic congestion, and of alkaline diuretics, especially of the acetate of potassa, which may be given in half-drachm doses every three or four hours. Nitromuriatic acid

is also a valuable remedy in these cases, at once acting favorably upon the liver and upon the diseased mucous surface.

Certain special remedies have been highly lauded as exercising almost a specific influence over the progress of dysentery. One of these is ipecacuanha. It is claimed that in full doses, frequently repeated, ipecacuanha, after the first emesis, loses its nauseating effects, and exercises a most happy influence on the progress of the disease. It is recommended in from five to six grains, twice a day, and some have even gone so far as to increase the dose to half a drachm or a drachm. In these heroic doses ipecacuanha has not been largely administered during the present war. The author has had no experience in its employment in such quantities. There can be no doubt, however, that in moderate doses ipecacuanha is a valuable remedy in the early stages of the disease, both from its action upon the skin and from the astringent effect upon the bowels which follows its use even when no opium is employed.

Mercurials have also been highly lauded in the treatment of dysentery, and there are few text-books on Practice which do not recommend them in some form or other. In camp dysentery, as it has prevailed in our own army, however, it is exceedingly doubtful whether their employment is judicious. They appear to exercise little if any influence over the progress of the disease, and accelerate the approach of the adynamic phenomena, which are too apt to occur. All the beneficial results claimed for them can be obtained by the simpler measures which have been already indicated.

SECTION IV.

Chronic Diarrhœa.

Acute diarrhœa and dysentery, of the forms described in the two previous sections, have been abundant in the army, especially during the summer months, but they have comparatively seldom proved fatal, and although figuring largely in the sickness rates, have but little to do with the mortality. Not so with the more serious form of diarrhœa next to be considered. A painful, exhausting, and protracted disease, this affection not merely produces a large proportion of the sick list, but is a frequent cause of death. The statistics of the Surgeon-General's office, however, as far as hitherto compiled, probably underrate greatly the mortality of this disease, and this for two reasons: first, because patients fatally reduced by diarrhœa not unfrequently perish from some intercurrent inflammatory attack, as will be hereafter shown, and then very generally the death is reported under the head of the intercurrent affection; and secondly, because large numbers of patients laboring under diarrhœa have been discharged from the army, many of whom have probably since died, and of whose fate no record has been received at the medical bureau.

The pathological conditions which produce chronic diarrhœa among our troops vary considerably under different circumstances; nevertheless, there is a certain general similarity among the varieties, based, as we shall see hereafter, on certain underlying pathological

states, and undoubtedly arising in the general similarity of the conditions under which the disease originates.

The disease frequently occurs as a sequel to camp fever, but the most characteristic form is that which originates independently, and it is this variety to which attention will first be directed.

Symptoms.—The disease frequently commences as a slight looseness of the bowels without any constitutional disturbance, the patient very often at the time of its commencement appearing to be in robust health. Sometimes, however, before the looseness appears, more or less disorder of the general health becomes apparent, manifested by anæmia and debility, with the symptoms already described as characteristic of chronic malarial poisoning, of the incipient scorbutic taint, or of the union of the two. At other times the complaint begins in an ordinary attack of irritative diarrhœa, or of acute enteritis or dysentery, and passes gradually into the chronic condition.

When fairly established, the symptoms become sufficiently characteristic: progressive emaciation sets in, with debility and depression of spirits; the countenance assumes a muddy, clay color, with which a slight icteroid hue is frequently blended; the pulse is moderately frequent (85 to 95); the heart irritable, and thrown into violent palpitations on the slightest exertion; the tongue pale, swollen, smooth, watery, indented on the edges by the teeth, its papillæ hardly perceptible; rheumatic pains in various parts of the body, especially in the back and limbs, are of frequent occurrence; the urine is sometimes scanty and high colored, sometimes copious and pale,

letting fall phosphatic sediments, occasionally albuminous, and not unfrequently quite normal.

The evacuations from the bowels vary in frequency and in character; sometimes they are excessively frequent, occurring every fifteen minutes or even oftener; as a general rule, however, this great frequency does not prevail, from three to six stools a day being a common number. They are often preceded and accompanied by considerable griping pain, but occasionally take place without any suffering. The discharges are liquid, clay colored, or pinkish, or occasionally of the normal feculent appearance, in the early stages of the disease. As the affection progresses, however, they generally become dark and offensive, sometimes black or dark brown from the presence of altered blood, sometimes various shades of dark red from the same cause. Bulky admixtures of tenacious mucus or of pus frequently occur.

If the patient's appetite is good and he eats indiscriminately, undigested fragments of food are readily detected in the discharges both with the eye and the microscope. The microscope also reveals intestinal epithelium, vast numbers of mucus or pus corpuscles, blood corpuscles in every stage of disintegration, phosphatic and other crystals, etc.

A careful microscopical and micro-chemical investigation of the discharges in these cases has yet to be undertaken, and will richly repay the investigator who will execute the laborious and disagreeable task.

An examination of the abdomen will generally detect more or less tenderness on pressure. This tenderness usually exists along the course of the colon.

It is sometimes greatest on the right side over the cœcum, sometimes on the left over the sigmoid flexure, sometimes it is present along the whole ascending transverse and descending colon. At times, however, the tenderness exists in the umbilical region, or extends thence into the right iliac, indicating, as will be hereafter seen, disease of the small intestine. Tenderness is frequently absent during the first few weeks of the complaint, being developed only at a subsequent period; occasionally it is altogether absent.

The appetite is variable and capricious, occasionally altogether absent, sometimes voracious. The patient can usually, even in cases in which he loathes his camp fare, be tempted to eat by delicacies, or indeed by ordinary food if well cooked and carefully prepared. As a general rule, there is a longing after pickles, fresh vegetables, and fruits, and after acid or subacid drinks.

The patient at first is not confined to his bed, but as weeks go by the debility becomes extreme, and he is compelled to keep the recumbent position. Simultaneously the emaciation goes on progressively to the last degree; the features become pinched; the skin hangs loosely over the wasted muscles; the complexion becomes muddy and opaque; a furfuraceous desquamation of epithelium often occurs, covering the surface of the skin with bran-like scales; the abdomen becomes shrunken and concave; the pulse is more frequent than at first, 100 to 120 beats a minute, or even beyond that point; the tongue remains as before, or assumes a dirty red, resembling a piece of raw beef; occasionally it becomes dry; the voice assumes a peculiar measured and feeble tone,

which is quite characteristic, giving sometimes the impression of being heard from a distance.

Patients who have reached this stage of the disease seldom recover. The course of the case from this point is, in the majority of instances, steadily and progressively downward. The discharges become more and more frequent; the feebleness extreme; ulceration of the cornea occasionally takes place; the voice is reduced to a whisper; the vital forces gradually give way, and the patient expires.

Very frequently, however, the disease terminates abruptly by some intercurrent affection. Sudden and overwhelming congestion of the lungs, proving fatal in less than twenty-four hours, is of comparatively frequent occurrence. A number of cases have also been reported, especially in the West, where patients laboring under the advanced stages of chronic diarrhœa have suddenly perished, with apoplectic symptoms, from serous effusion into the ventricles or about the base of the brain. Suppression of urine and consequent uræmic intoxication are also occasionally among the immediate causes of death.

As has been already hinted, cases which are to terminate in recovery seldom sink into the extreme condition above described, but begin gradually to improve at an earlier period; still, amendment may occur at any time before death, even in extreme cases, though this is comparatively rare. In any case, the convalescence is tedious, and relapses are frequent.

An analysis of the symptoms of most cases in their early stages will show that the patient is more or less under the influence of malarial poisoning, or of a tendency to scorbutic disease. The icteroid anæmia,

the enlarged spleen which very frequently exists, the occasional occurrence of paroxysms of intermittent fever, or of periodical aggravations of the disease, are evidences of the first condition. The muddy complexion, the flabby, watery tongue, the irritable heart and pulse, the rheumatic pains, will readily be recognized as indicative of the second.

The mind is generally desponding, depressed, confused, and indisposed to the slightest exertion. There is, however, as a general rule, no delirium even in extreme cases.

Disorder of the functions of the skin is shown in the peculiar muddy hue of the surface, and in the bran-like desquamation described above. It is usually dry and harsh, its secretions deficient, but is occasionally moist and clammy. Night sweats also are not unfrequent.

Among the various complications of the affection, abscesses of the cellular tissue around the rectum deserve to be mentioned. The cases which have come to the knowledge of the author occurred chiefly in the army of the Potomac while operating upon the Peninsula. The abscesses usually point near the anus, and frequently form complete fistula in ano, which, however, in most cases heals spontaneously if the patient recovers of the diarrhœa, as very generally happens in these cases. Critical abscesses of other parts of the body, followed by recovery, are not unfrequent.

The ulcers of the cornea, alluded to as occurring occasionally in the latter stages of fatal cases, are deserving of special mention. A number of cases have occurred in the Washington hospitals, but the majority of those reported were in the West.

The ulcer begins as a slight cloud-like opacity in the center of the cornea, which gradually becomes more and more opaque, until finally a minute oval or rounded excavated ulcer makes its appearance. The ulcer occasionally penetrates the cornea and evacuates the humors of the eye. The cases of diarrhœa in which this symptom has been noticed have all been accompanied by the last degree of emaciation, and have all proved fatal. Post-mortem examination has shown in them extensive ulceration of the colon.

Occasionally during the progress of protracted cases cough sets in, with dullness of percussion at the apex of one or both lungs, and other signs of tubercular deposit. This is to be regarded rather as the development of a previously existing tuberculous tendency, probably already expressed in moderate tubercular deposits before the diarrhœa set in, than as one of the direct effects of the bowel disease. Certainly curious relations occasionally exist between the tuberculous deposits in these cases and the special pathological lesions of the bowels, and the presence of tuberculous deposits in the lungs and even of tuberculous ulcers of the small intestines may coexist with the characteristic colon of camp diarrhœ, as is seen in a remarkable specimen in the Army Medical Museum.

The relation which exists between chronic diarrhœa and camp fever is a subject of considerable interest. Diarrhœa is in fact one of the most fatal sequelæ of camp fevers, the looseness of the bowels characteristic of this disease continuing after convalescence from the fever has set in, and gradually assuming all the peculiarities above described. Diarrhœa is often also present as an initiatory

symptom for several weeks before the fever begins. In some of these cases the febrile affection stands in a direct genetic relation to the bowel complaint, but in the majority of cases the complication is rather to be considered as a coincidence, resulting from the fact that the patient has been exposed to the causes of both diseases, than as due to any influence of the one in developing the other. Certainly at least in those cases of chronic diarrhœa consecutive to fever which prove fatal, the condition of the colon observed after death is precisely similar to what occurs in patients in whom no febrile disease has been an antecedent.

It must not be supposed that camp diarrhœa is always a continuous disease. It is very frequently manifested for a long time rather as a tendency to occasional slight attacks than as a permanent affection. The patient presenting the constitutional evidences of malarial or scorbutic cachexia in a variable degree, is liable to slight attacks of diarrhœa after the most trivial exposures. Any overexertion, any change in weather, any indiscretion in diet produces a looseness which readily yields to treatment, to recur again in the course of a few days on some equally trivial occasion, and to yield as readily as before. Between the attacks, however, the bowels are not perfectly healthy, the stools are more or less clay colored and irregular in frequency; often there is constipation, generally some evidences of disordered digestion, which should satisfy the surgeon that the patient is not well.

Such cases should always be looked upon with suspicion and carefully treated. If neglected, they pave

the way for the severer forms of the disease already described.

Pathological Anatomy.—The characteristic lesions of chronic diarrhœa, as it has occurred in the army during the present war, are to be sought in the small intestines and colon, but especially in the latter. In a general way, it may be stated that the mucous membrane of the ileum and colon, sometimes of the whole intestinal tract, is softened and thickened, the solitary and agminated closed follicles enlarged, with a tendency especially in the colon to the formation of ulcers, the starting-points of which are usually softened and broken-down solitary follicles.

The intestinal lesions will be presented seriatim.

The *stomach*, frequently healthy, presents, nevertheless, in numerous cases marked lesions. It is often considerably diminished in size, sometimes to one-fourth its normal capacity, or even less. This happens especially in long protracted cases, in which there has been great intolerance of food. At other times it presents marked evidences of chronic inflammatory action, and this in cases in which no nausea or vomiting has existed during life. The mucous membrane is of some shade of dark red, reddish brown, ash or slate colored, or even greenish, and minute punctiform ulcers, surrounded by a small reddish areola, are sometimes observed. Dark-red ecchymoses are occasionally present, especially in the greater curvature. These lesions are comparatively rare in cases that have lasted less than two months.

The *small intestine* is also occasionally quite healthy throughout the duodenum and jejunum. Generally, indeed, these portions escape the intense disturbances

which are so commonly seated in the ileum and colon, but in most cases there is more or less enlargement of the solitary follicles throughout the whole intestinal tract, often combined with deposits of dark pigment in these organs, showing that the upper portion of the alimentary canal participates to some extent at least in processes going on lower down.

The *ileum* is generally the seat of considerable pathological alterations. The mucous membrane is more or less thickened, often softened; the thickening and softening being most marked near the ileo-cœcal valve, and gradually diminishing toward the jejunum. The surface of the membrane is of a dark reddish or reddish brown, sometimes slate or ash colored, dark-greenish tints occasionally prevailing. Generally the dark-greenish or slate colors prevail toward the ileo-cœcal valve, passing gradually into the reddish shades higher up, and these again still higher shading into the natural pale-pinkish color of the intestinal mucous membrane. The solitary follicles and those of the patches of Peyer are almost always somewhat enlarged; at times only slightly so, at other times assuming the dimensions of small shot. Very often they are the seat of pigment deposits, so that the locality of each follicle can be readily recognized with the naked eye, by the presence of a small bluish-black dot, which in the Peyerian patches gives rise to the appearance of the freshly shaven chin, and is sometimes called the shaven-beard appearance. In many cases there is no ulceration, but ulcerations of variable extent are present in the majority of instances. These may be seated in the Peyerian patches or in any part of the mucous membrane. In the latter

case the ulcer usually takes its origin in one of the solitary follicles. The ulcers in the Peyerian patches not unfrequently resemble closely those of typhoid or typho-malarial fever, and this even in cases in which no febrile reaction has existed throughout the disease. In most cases, however, the patches of Peyer although thickened are not ulcerated. The ulcers of the solitary follicles are usually minute, punctiform, with a yellowish base, surrounded by a reddish areola. At times, however, they are irregular, of various sizes, up to that of a five-cent piece, or even larger, with irregular, thickened, undermined edges, and an ash-colored foul base. The minute anatomy of these changes will be discussed in the sequel.

The blood-vessels of the ileum are usually much injected, so that sometimes their ramifications can be readily observed with the naked eye through the mucous surface of the piece.

The *colon* is the seat of changes which are more constant and profound than those of the small intestine. The mucous membrane is generally much thickened and softened, the thickening being in extreme cases so great that in perpendicular sections the distance from the muscular coat to the mucous surface may be more than a quarter of an inch. The thickening and softening, as indeed all the morbid changes, are most constant and most intense at the two extremities, the cœcum and the sigmoid flexure and rectum. The same colors prevail which were described as belonging to the small intestine—a dark, livid red, a slate color, ash color, and greenish hues. The solitary follicles are generally enlarged, and are often the seat of pigment deposits, similar to those described as occurring

in the small intestine. *Ulceration* is sometimes altogether absent, and this in cases in which there are ulcerations in the small intestines as well as in those in which there are none. This is especially true in semi-acute cases occurring among those who have been exposed to intense malarial influences, and running their course to a fatal issue in from four to six weeks. In such cases, thickening, softening, and discoloration of the mucous membrane of the ileum and colon, with enlargement of the closed follicles, and frequently with pigment deposits in them, are often the only pathological alterations of the intestine; and this not only as has been supposed by some in the so-called "Chickahominy diarrhœa" of the Peninsular campaign, but in cases occurring in the malarial regions of all parts of the country. In the discussion of the pathological histology of the intestinal mucous membrane, it will be shown that these cases differ only in the degree of the lesion from those in which ulceration is present.

In the majority of cases, however, more or less ulceration of the colon is found to exist. The ulcers, which appear to originate in the breaking down of individual solitary follicles, vary in size from that of a pin's head to vast jagged erosions nearly the size of the palm of the hand. In a very common variety the ulcers are about the tenth of an inch in diameter, with abrupt edges, and penetrating deeply into the membrane as if cut out with a punch. In other cases, many of the solitary follicles are enlarged to the size of a mustard-seed or larger, the little tumor projecting like a pimple upon the mucous membrane, and a small yellowish or grayish ulcer seated upon

its apex. Not unfrequently, however, the ulceration progresses to a more destructive degree; the ulcers are half an inch, an inch, two inches or more in diameter, penetrating often quite to the muscular coat, sometimes invading it, with ragged, jagged, undermined edges, and foul ash-colored or slate-colored base. The seat of these extensive ulcerations is most frequently the sigmoid flexure and the rectum, but they may be located in any part of the colon. The amount of destruction occasionally observed is astounding; the intestinal surface, riddled with ulcers as though it was worm-eaten, appears ready to be penetrated at many points. Actual perforation, however, must be very rare, but one case having as yet come under the notice of the author. In this case, the thickening of the colon was very great, the ulcerations numerous and extensive, and the fatal perforation, irregular in outline and nearly half an inch in diameter, was situated in the cœcum. The specimen is in the Army Medical Museum.

The portion of the mucous membrane which has escaped ulceration is not unfrequently coated with the so-called pseudo-membranous or croupous products, which are also, though not so frequently, to be observed in cases in which no ulcers exist.

The *intestinal contents* are worthy a few brief remarks. The *stomach*, in the absence of various alimentary solids or fluids, most frequently contains a thin liquid mucus, which is sometimes, but rarely, stained with biliary matters.

The *small intestine* contains a thick tenacious mucus in variable quantity, which in the duodenum and upper part of the jejunum is of a light-yellow

color, becoming more and more dark and greenish through the lower part of the jejunum and ileum. The reaction of these contents is most generally alkaline.

The odor is the faint nauseous odor of biliary matters in the upper part of the small intestine, sour and peculiar in its lower portion. The *colon* sometimes contains more or less liquid or semi-solid feculent matter, with the usual odor and appearance. Very generally, however, it contains a variable quantity of a dark-brownish or reddish-brown fetid liquid of an alkaline reaction.

Histology of the Intestinal Lesion.—If, now, from the study of the grosser appearances of the intestinal lesion, observation be directed to the histological conditions present in the diseased mucous membrane, a train of phenomena will be observed which are not only of importance in determining the true nature of this disease, but of the profoundest interest, from their bearing on the modern anatomical doctrine of the inflammatory process.

In this investigation, the mucous membrane should be studied, partly in the fresh state, in thin sections cut with a sharp knife or with curved scissors, and partly in thin sections cut from pieces dried with or without previous hardening, and afterward soaked in dilute acetic acid, or in a dilute carmine solution with subsequent treatment with acetic acid.

In the simplest cases—those, namely, in which the mucous membrane is more or less thickened and softened—the following changes can readily be observed in thin perpendicular sections.

In specimens but moderately diseased, as the ob-

ject is moved beneath the microscope, the branched connective tissue cells of the submucous tissue next to the muscular coat will most generally be found quite normal, or slightly enlarged and granular; but as the portion observed approaches nearer and nearer to the base of the follicles of Lieberkühn, the connective tissue cells will be found enlarged, their nuclei multiplying by division, cells containing groups of nuclei become common, and the intercellular space is encroached upon. Finally, great groups of small rounded or slightly polygonal cells occupy the places and represent the progeny of the normal connective tissue cells of the membranes. The delicate layer of muscular tissue immediately beneath the bases of the tubular follicles, overwhelmed, perhaps sharing in this luxurious cell growth, is in marked cases no longer recognizable. In slighter cases, however, it can be still distinctly observed, its rod-like nuclei often enlarged or even dividing. In the most intense cases, the luxuriant cell multiplication here described, as attained toward the surface of the membrane, may take place throughout its whole thickness, and even involve the subjacent muscular layer.

The processes which go on in that more superficial part of the mucous membrane which contains the tubular follicles are less readily investigated, in part on account of the greater complexity of the structure, in part also on account of the more advanced condition of the disease in these parts as generally brought under observation. Considerable investigation is yet required to elucidate completely the process in these parts. The following points, however, may be observed with a little patience: The same luxuriant

cell multiplication described as taking place in the connective tissue corpuscles, beneath the base of the follicles, takes place also in the scanty connective tissue between them, which in extreme cases is converted into a mass of rounded or slightly polygonal granular cells, similar to those above described; but the behavior of the epithelium coating the mucous membrane and lining the follicles is difficult to trace in all its details. It is clear that the epithelium of that portion of the follicle which is nearest the orifice submits most readily and with the greatest rapidity to the changes which occur, for in thin sections the bottoms of the follicular pouches are often clearly discernible, lined with an epithelium more granular than normal, but otherwise but slightly altered, while the upper part of the follicle is already crowded with rounded granular cells, which form a continuous mass with those developed in the interfollicular connective tissue. A careful observation of the transitions, in such cases, between the comparatively normal epithelium of the bottom of the follicle and the brood of minute elements in its more superficial portion, leaves no doubt that the cells of this epithelium itself, by a luxuriant multiplication, give rise to the formation of the new elements, and hence arises the probability—not yet, however, demonstrated by the author's actual observations—that the cells of the epithelium of the surface of the mucous membrane share in the same process, although it is possible that this simple layer of single cells is merely exfoliated, and that the new progeny by which it is replaced is derived from the minute cells of the subjacent connective tissue.

The probability of an actual nucleus multiplication, and resulting cell-brooding in the single layer of intestinal columnar epithelium thus indicated, receives strong confirmation from the observation of Dr. C. J. Eberth, Prosector in Würzburg, who has described and figured* columnar cells undergoing the process of multiplication, observed by him floating in the intestinal contents of a duck, which, if his figure is accurately drawn, can hardly be interpreted otherwise than as belonging to the superficial intestinal epithelium.

In the *closed follicles* the process appears in all respects anatomically similar to that already described as existing in typho-malarial fever. The cells forming the parenchyma of the follicles exhibit, according to the degree of enlargement present, every stage of multiplication. The connective tissue capsule of the follicle shares, as a general rule, in the processes going on in the surrounding connective tissue, so that although with a low power the position and outline of the follicle can be recognized by the dark, more or less opaque, oval, or rounded shade which it presents, the study of the preparation with a higher power, frequently shows the minute granular cell forms of the contents of the follicle to be so closely imitated by the little granular cells resulting from the cell multiplication going on in the capsule and the surrounding connective tissue, that it is sometimes almost or quite impossible to draw the line where the follicle terminates and the surrounding connective tissue begins.

Ulceration, at least in a large number of cases,

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* "Zur Entstehung der Schleimkörper," Virchow's Archiv, 1861, second series, vol. i. part i. p. 106, also plate i. fig. 1.

appears to originate in the rupture of one of the closed follicles and the discharge of its softened contents into the intestinal cavity. This is followed by the liquefaction of the intercellular substance, and the consequent liberation of the broods of minute cells into which the surrounding connective tissue has been transformed. Hence results one of the punched-out ulcers described above. In the subsequent extension of the ulceration to a considerable size, the progress seems to take place chiefly in the submucous connective tissue — the portion of the mucous membrane which contains the follicles resisting the process until undermined and its nutritive supply cut off by the extension of the ulceration beneath. Hence arises the excavated undermining character of the edges of the ulcers. From the anatomical point of view it will therefore be perceived that the morbid process in the cases in which there is no ulceration is essentially the same as in those in which ulceration is present. The one lesion is only a later stage of the other.

The *pigment deposits*, referred to above in the general description, occur as minute granules, usually at least, deposited within the cell elements of the follicles.

The scope of this work does not permit further details with regard to the histology of the intestines in chronic diarrhœa. The author's studies on this subject are, moreover, far from complete; he trusts, however, to be able to complete a paper on the subject—now in the course of preparation—for publication, with illustrative drawings, in the first volume of the Medical History of the War, to which the

reader is respectfully referred for a fuller discussion of the subject.

Besides the morbid conditions above described as existing in the intestines, lesions will generally be found in other organs.

The *mesenteric glands* are very frequently enlarged, softened, and occasionally the seat of pigment deposits. This is especially the case when the small intestines are the seat of disease.

The *spleen* is very generally more or less enlarged and softened, presenting the appearances described as observed in typho-malarial fever.

The *liver* has sometimes the nutmeg appearance, sometimes is fatty, occasionally presents a preternatural pigment deposit in the hepatic cells.

The *kidneys* are very often more or less enlarged, flabby, the cortical portion encroaching on the pyramids, the epithelium of the tubuli uriniferi granular or even fatty.

The above are the lesions most characteristic of the disease. Other appearances very frequently observed would seem related rather to the complications or intercurrent affections than to the disease itself, such as congestion or consolidation of the lungs, serous effusions into the ventricles of the brain or about the medulla oblongata, abscesses in the pelvic or perineal connective tissue, or elsewhere, etc.

Nature of the Affection.—From the account above given of the pathological anatomy of the disease, there can be little doubt that this affection is to be regarded as consisting essentially of a chronic inflammatory process, involving primarily the mucous membrane of the ileum and the colon. It may in fact be described

simply as a chronic ileo-colitis, with a tendency to ulceration; and the question readily suggests itself, in view of this fact, would it not be more exact to describe this affection rather as chronic dysentery than as chronic diarrhœa? The army surgeons in the field, who see it most frequently, differ in their nomenclature, and the same cases called by some chronic dysentery, are called by others chronic diarrhœa. Much could be urged in favor of either designation, but except that it is desirable to secure uniformity of nomenclature, the question is probably not one of any great practical importance. The author has been led to select the term chronic diarrhœa because the discharges, although often bloody, are more copious and less frequent than is common in chronic dysentery as it usually occurs; because tenesmus is frequently absent throughout; because the majority of surgeons are in the habit of giving it that name; and finally, because the disease presents so many points of difference from the affection generally known as chronic dysentery in European armies that it appears desirable to distinguish it by another name. The only epidemic closely approximating this which has been brought to the knowledge of the writer, is the chronic diarrhœa of the Mexican war.

Causes.—It would be premature and out of place in this treatise to attempt to speculate upon the proximate causes of chronic diarrhœa. The remarks in this place will be limited to a naked enumeration of the conditions under which the disease occurs.

Originating chiefly among troops in camps, the disease evidently stands in some definite relationship

to the usual conditions of camp life. Of these it would appear most intimately connected with the diet, and this relationship is of such a kind that chronic diarrhœa becomes more and more common and fatal as the constitutional modifications which result from camp diet approach more and more to the condition of recognizable scurvy, a most important point to be considered in connection with the hygienic treatment of the disease. As a consequence it has more than once happened on a grand scale, during the present war, to see a sudden and palpable diminution in the amount of diarrhœa follow the liberal issue of potatoes and onions to an army in which the tendency to scurvy was exhibiting itself in a manner too evident to be overlooked.

In addition to the influence of camp diet, the tendency to the disease is provoked, or at least aggravated, by crowding large numbers of men together in limited encampments, by overcrowding the tents, by want of general police and of personal cleanliness, by exposure to inclement weather with insufficient shelter, and by excessive and fatiguing marches and other labors. The effects of all these causes are much aggravated in malarial regions and in warm weather.

Treatment. — In the successful treatment of this serious and obstinate affection, hygienic measures are above all indispensable; and although therapeutic remedies are not to be despised, and, when judiciously administered, are often followed by the happiest result, yet if suitable hygienic management is neglected, they will generally prove quite fruitless, while proper cleanliness, ventilation, shelter, and diet will often suffice to effect a cure unaided by any medicinal treatment.

It is not necessary to repeat in this place the general remarks made in the chapter on typho-malarial fever, with regard to the location, warming, ventilation, and police of field and general hospitals. All that was there said is equally applicable to the hygienic treatment of diarrhœa. (See pp. 114–134.) The remarks now made under the head of hygienic treatment will therefore be limited to a brief discussion of the diet suitable for cases of chronic diarrhœa.

The diet in these cases should be nutritious and supporting, without being of such quantity or quality as to offend the enfeebled digestive powers and increase the flux; and if the slightest evidences of a scorbutic tendency can be detected, an antiscorbutic regimen should be unhesitatingly resorted to in spite of the unfortunate prejudice against the use of vegetables in diarrhœa.

Food in a liquid or semiliquid form is especially desirable, because more readily digested, as a general rule, than solid food.

Milk is an exceedingly useful article of diet in these cases; it may be given alone or combined with farinaceous food. It may, for example, be thickened with rice flour or rice, or may have bread broken in it. Where the use of milk is followed by gastric uneasiness or other "bilious" symptoms, wine-whey may be substituted, or in many cases the natural curd and whey of sour milk can be used with advantage, or buttermilk may be employed, which is sometimes much relished by the patient. Cheese is also an available article of diet, and is usually favorably received.

Rice in almost any form is an excellent article in these cases, plain boiled, boiled with milk, or dressed

with curry powder, as the varying appetite of the patient may suggest.

Readily digested vegetable food, such as ripe fruits and properly cooked vegetables, is not to be indiscriminately forbidden, as is too generally done. In all cases in which the patient has been long deprived of vegetable diet, or in which recognizable symptoms of incipient scurvy can be detected, it should be cautiously but deliberately resorted to. As the abrupt use of vegetables in full quantities almost always greatly aggravates the symptoms, they should be employed with great caution at first, and the patient gradually accustomed to their use. The pulp of oranges, lemon-juice alone or in the form of lemonade, roasted apples, mealy, well boiled, or roasted potatoes, and stewed tomatoes may be especially mentioned as useful. But no vegetable substance conveniently attainable, for which the patient expresses a decided desire, should be refused a trial. In any case the vegetable substances selected as diet should at first be cautiously used, and in small quantities, and any of them should be abandoned if, after a careful trial, it is found to aggravate the symptoms. In different cases the most diverse idiosyncrasies will be observed in this respect. Some patients will be found unable to digest soft bread in any stage of the disease, its use being invariably followed by a fresh outbreak; others are unable to manage potatoes in any form, and so on. Such idiosyncrasies must be carefully respected by the physician who desires success.

In the advanced stages of the disease, where the debility and exhaustion are well marked, the use of nutritious animal food is imperatively demanded.

Meat broth, beef tea, or beef essence may be employed to meet the indication, under the general restrictions laid down in the article on the dietetic treatment of typho-malarial fever; if, however, these articles are found, after careful trial, to aggravate the diarrhœa, they should be discontinued. In this case it will sometimes be found that broiled chicken, beefsteak, or mutton-chops will be tolerated, and under such circumstances they may be allowed in moderate quantities. Oysters and soft-boiled eggs may also be used where the debility is great, if, after trial, they are found not to irritate the bowels.

The general principle is to be borne in mind throughout, that generous nutriment is required, but that the effect attained will be measured by the amount digested and not by the amount swallowed. Whatever, therefore, proves on trial to provoke indigestion or to aggravate the state of the bowels must be unhesitatingly abandoned.

As to *exercise*, the patient is frequently so weak as to be obliged to retain the recumbent position; when able to move about, however, it is well to cause him to walk out, and in fine weather to sit a little while daily in the open air, rather than to confine him closely to the ward of the hospital. Walking in the sun, or fatigue of any kind, should, however, be avoided. Great discretion is needed in giving to such patients permission to go beyond the hospital inclosure, especially in the case of hospitals located in the neighborhood of great cities. Few patients are able to resist the temptations to excesses as to food and drink which are encountered under such circumstances, and these excesses are almost

invariably followed by increased violence in the disorder.

Great benefit may be derived from the judicious use of baths in this complaint. Where the debility is extreme, the patient may simply be sponged daily with tepid water, at once to secure cleanliness and to promote the healthy secretory action of the skin; when he is strong enough to bear it, however, a regular daily bath should be enjoined.

In feeble cases the bath should be tepid (75°–80° Fah.), and the patient should not be allowed to remain in it more than five to ten minutes; where, however, he is able to walk about, the cold shower-bath is preferable, especially in warm weather. In doubtful cases the propriety of the cold bath can be recognized by the effect it produces: if it is followed by a healthful reaction, indicated by a pleasant glow of the surface, it is beneficial, and should be continued; if, however, it is followed by chilliness and shivering, it should be discontinued, and the warm bath should be subsequently preferred. Where the skin is habitually moist and clammy, sponging with salt water is exceedingly desirable.

The therapeutic measures to be adopted are both general and local.

The general measures consist in the administration of tonics and astringents, with or without the use of anodynes. Sulphate of copper, nitrate of silver, pernitrate of iron, subnitrate of bismuth, and the mineral acids are among the most valuable astringents.

Sulphate of copper may be given in pill in the dose of one-twelfth or one-eighth of a grain every two hours. If combined with opium, minute doses of the

latter agent should be employed, one-eighth to one-fourth of a grain of opium being combined in each pill. Nitrate of silver may be given in pills of one-eighth to one-fourth of a grain, every two hours, alone or combined with opium, as in the case of sulphate of copper. Its use should not be persisted in more than a few weeks, on account of the danger of inducing permanent discoloration of the skin. Syrup of the pernitrate of iron (liquor ferri pernitratis) may be given in the dose of ten drops, in sweetened water, every three or four hours. Tincture of the chloride of iron in the same dose, though less powerful, is also a valuable remedy.

The subnitrate of bismuth, in many cases, gives exceedingly satisfactory results. A pamphlet recently published on the treatment of diarrhœa, by Acting Assistant Surgeon John B. Trask, U. S. A., calls professional attention to this remedy, and lauds it as the most valuable of the mineral astringents. Medical Inspector E. P. Vollum, U. S. A., has informed the author that he has for a number of years used this drug in the treatment of the diarrhœa of California and Oregon, with the happiest results, especially in those cases in which there is nausea or other disorder of the stomach. It has lately been rather extensively tried in the Washington hospitals, and in some of the regiments in the field, and with variable success. Its failure in some cases has been due to the insufficient dose employed, in others to neglect of the necessary hygienic measures which should accompany all medication in this disorder, but yet in other cases undoubtedly either to the obstinacy of the disease or the inefficiency of the remedy. The author has given

it a fair trial, and while he is far from regarding it as a specific, believes it to be a most valuable article in both simple irritative, and in chronic diarrhœa. It may be used three or four times daily, in doses varying from five grains to a scruple. Dr. Trask employs a drachm to four scruples daily, in a single dose, and lays great stress on the importance of using it thus rather than in smaller quantities more frequently repeated. This view does not correspond with the general experience on the subject.

Of the mineral acids, aromatic sulphuric acid is the most generally available; ten drops may be given, in sweetened water, three or four times daily. It may be combined with laudanum in equal quantities. Where there is great torpor of the liver, indicated by the absence of biliary matters from the stools, and the icteroid hue of the conjunctiva or of the complexion, nitromuriatic acid may be substituted in the same dose.

Hope's camphor mixture, which is composed of a fluid drachm of nitrous acid, forty drops of laudanum, and eight fluid ounces of water, has been found very useful in the dose of a tablespoonful every two hours.

Acetate of lead, in the dose of a grain combined with one-fourth of a grain of opium, in pilular form, has been largely used by many surgeons, and in many cases with beneficial results.

Tannin, and the vegetable astringents generally, are to be regarded as far less useful in these chronic cases than in the latter stages of the irritative form of simple diarrhœa.

The question of the use of *opiates* has excited considerable difference of opinion among military sur-

geons during the present war. While some administer them invariably, and with a freedom which borders on recklessness, others go so far as to exclude them altogether from their plan of treatment. The truth probably lies as ever between the two extremes. In cases in which the discharges are accompanied by griping or abdominal pain, opiates in moderate quantities are almost always admissible for the purpose of giving relief from this symptom. In this class of cases, they should be administered, combined with the other remedies employed, in moderate doses, frequently repeated, the quantity given being regulated by the violence of the symptoms and by the susceptibility of the patient. So also in cases attended by restlessness and sleeplessness at night, opiates may be administered in full doses at bedtime for the purpose of procuring sleep. Except under the above circumstances, however, they should be avoided as a general rule, as exercising little or no curative influence over the disease, and as liable, by interfering with the already impaired digestion, to do positive harm.

Where opiates are employed, great advantage may be derived from combining them with ipecacuanha, and thus inducing a determination to the skin. Dover's powder appears for this reason an eligible preparation, whether for combination with the mineral tonic astringents, or for administration at night, with a view to produce sleep. Ipecacuanha alone, in large doses, has been resorted to advantageously in the diarrhœa and dysentery of other countries, especially in the East Indies, and this fact has led to its employment to a certain extent and with some advantage in the diarrhœa of the present war.

Alcoholic stimulants may be employed with advantage in all cases accompanied by much debility and prostration. Wine combined with milk, in the form of wine-whey, or brandy with milk, as milk-punch, are the most desirable preparations; but pure brandy or whisky may be administered if the degree of prostration calls for urgent measures. Good brandy is undoubtedly infinitely preferable to whisky in these cases; but the brandy most generally encountered in the American market is so often only a miserable imitation that, except under peculiar circumstances, whisky is the safer preparation for use.

Certain special remedies are of value in some of the varieties of the disease, and have hence been perhaps too recklessly administered in all cases.

In cases accompanied by general muscular relaxation, with loss of appetite, and without marked abdominal pain or tenderness, nux vomica, or some of its preparations, will be found exceedingly useful. It may be given in the form of extract, in the dose of half a grain to a grain, three times a day, or in tincture, in five to fifteen drop doses, or strychnia itself, in the dose of one thirty-second of a grain, may be employed. It may be given alone, combined with opium, or with one of the mineral astringents above mentioned. In any case its effects should be carefully watched, and the dose should be diminished or the remedy altogether abandoned so soon as twitchings of the muscles of the face or any other part make their appearance.

Another remedy, applicable to a special group of cases, is Fowler's solution of arsenic (liquor potassæ arsenitis), which may be given in the dose of from

five to ten drops, three times daily. This remedy, which has been confidently recommended as applicable to all forms of diarrhœa, would appear to be specially adapted to those cases in which indications of the effects of malarial poisoning can be detected among the symptoms. It should always be given after meals, to avoid the disagreeable nausea which otherwise is apt to follow its use.

In the same group of cases, the sulphate of quinia, in the dose of two grains, three or four times daily, may be given with advantage, either alone or combined with some preparation of iron.

When, as occasionally happens, the disease assumes a decidedly intermittent form, quinia may always be administered with advantage, in full antiperiodic doses.

Among the remedies liberally employed in chronic diarrhœa, is one group which can only be mentioned with disapprobation. This is the mercurials, which are too frequently administered to gentle salivation in the form of blue pill or calomel, combined with opium and ipecacuanha. The authority of some of the most distinguished American medical writers is in favor of the employment of mercurials in the chronic diarrhœa of civil life; yet when it is remembered that even those modern writers who most warmly advocate their general employment in the treatment of inflammation, recommend them to be discontinued as injurious whenever the process has gone on to ulceration, it would appear that even sound mercurialists would avoid using them in the form of chronic diarrhœa which is most common in the army.

Practically it will be found that although in some

cases mercurials may succeed, as much less dangerous remedies would have done, in checking the progress of the disease, yet that in the majority of cases their employment is accompanied by an increase of the debility, the loss of appetite, the anæmia, and the general constitutional symptoms, without any diminution in the frequency of the stools. They are therefore to be regarded as dangerous and inefficient, and their use in these cases has been completely abandoned by those surgeons who are most successful in the treatment of the disease.

In the selection of the remedy to be employed in any individual case, the surgeon will of course be more or less influenced by his own personal experience as well as by the special condition of the patient. The author has been led to prefer the sulphate of copper, the subnitrate of bismuth, and the mineral acids for general use, resorting to the preparations of iron in peculiarly anæmic cases, and to arsenic or quinia in those which give evidences of a malarial taint. In any case the surgeon must, however, be patient with his remedies, and not restlessly change them every few days, as is too often done. The disease is essentially a slow one, and the remedy selected should have a thorough trial before it is abandoned for another. Of course if unpleasant symptoms attend the use of any drug, and numerous idiosyncrasies will be found to exist, it should be at once discontinued and some other remedial agent substituted.

Throughout the course of the disease, the urine should be carefully watched, as affording valuable indications as to the general condition of the patient. Where this secretion is scanty, and especially where

it is albuminous, the greatest benefit will often result from the employment of alkaline diuretics. The acetate or bitartrate of potassa in half-drachm doses, two or three times a day, will be found useful in such cases, and the free re-establishment of the secretion of the kidneys will frequently be followed by a marked improvement in the general condition of the patient.

Judicious local treatment, although too often neglected, is certainly of the utmost importance. Both external remedies and enemata will be found useful. Occasional dry cupping over the course of the colon, or flying blisters in the same region, will frequently prove advantageous. The point of greatest tenderness should be selected for the application of these counter-irritants. Where there is much abdominal pain, emollient cataplasms should be persistently applied.

In obstinate cases, inunctions of iodine, or the application of tincture of iodine to the surface of the abdomen, are frequently beneficial.

But by far the most valuable local measure is the employment of solutions of the mineral astringents as enemata. Sulphate of copper, nitrate of silver, sulphate of zinc, or acetate of lead, with or without opiates, may be employed for this purpose. Of these sulphate of copper and nitrate of silver are probably the most efficient. They may be used of the strength of one or two grains to the ounce of water; from one to six ounces of the solution may be thrown into the rectum at a time, and the remedy may be repeated twice or three times daily. When it is remembered that the rectum and sigmoid flexure are the most frequent seat of ulceration, the value of these topical

remedies is at once accounted for. Practically the most salutary effects will be found to follow their use. Where the rectum at once rejects the enema, it may be combined with laudanum, twenty to forty drops of which may be added to each enema.

The injection should be carefully thrown in, and the pipe of the syringe gently withdrawn in order that the fluid may be retained at least for some little time.

This method of treatment will often be found efficient in cases which have obstinately resisted all remedies administered by the mouth, and should be resorted to in all protracted cases.

Assistant Surgeon Albert Hartsuff, U. S. A., who has used injections of the nitrate of silver largely, and with the most satisfactory results, employs them in a still more concentrated form than is recommended above. He injects a solution of five to ten grains of the nitrate to the ounce of water, three times daily, and, as he has informed the author, with the greatest success.

In the convalescence from this disease, great care should be exercised both in the diet and in the treatment of the occasional relapses which from time to time are apt to occur. Any excess or indiscretion as to food, drink, or exercise, is apt to produce a recurrence of the disorder, and should be carefully avoided. After grave attacks the patient should not be returned to duty until he has fully regained his flesh and strength, and been at least a month free from any recurrence of the complaint.

The occasional complications of the disease are to be treated on general principles. Sudden congestions

of the lungs, brain, or other organs are best met by the judicious employment of alcoholic stimulants, and the application of dry cups to the chest or nape of the neck, as the case may be, and by sinapisms to the extremities, or hot pediluvia. Abscesses should not be hastily interfered with, but should be allowed to open spontaneously, unless by their size and locality they threaten to do mischief if left to themselves.

By a judicious employment of these measures it is believed that a large majority of the cases of chronic diarrhœa can be conducted to a satisfactory termination.

CHAPTER VII.

CAMP MEASLES.

One of the most characteristic diseases of the present war has been epidemic measles, from which few of the new regiments have entirely escaped. The official returns to the Surgeon-General's office for the first year of the war greatly underestimate the prevalence of this disorder, and this especially because a large number of the regiments suffered from the disease while still in the camps of instruction in their respective States, prior to being mustered into the service of the United States. In this case no reports of the number taken sick were forwarded to the Surgeon-General's office. Even after the new regiments were mustered into the service of the United States, however, it was generally some months before the regimental surgeons learned regularity in making the reports of sick and wounded required by regulations, and it was precisely during this early period, for which so often no reports were made, that measles most frequently occurred.

Notwithstanding these innumerable deficiencies, 21,676 cases and 551 deaths from measles were reported during the first year of the war. The number of deaths represented by these figures far underestimates the mortality proceeding from this cause. In

fact, the disease was rather fatal in its sequelæ than in itself, and many of the fatal cases of pneumonia and catarrh were consequences of the previous attacks of measles from which the patients had suffered.

Epidemic measles generally made its appearance at an early period in the history of each regiment, frequently in its first encampment, and swept through the ranks, attacking all who had not previously had the disease, and occasionally even these did not escape. Frequently from one-third to one-half of the effective strength was attacked, and the disorder continued its ravages until all who were susceptible had suffered. The duration of the epidemic in a regiment was usually from one to two months, and the patients continued to suffer from its sequelæ for a still longer period. It was most severe and found the greatest number of victims in those regiments which were recruited in the rural districts, and attacked comparatively few in those raised in towns and cities.

Frequently fatal in itself, this epidemic was, however, especially to be dreaded on account of the disorders which followed in its train. Severe bronchitis, often of considerable duration; typhoid pneumonia, which frequently proved fatal; and a general exhaustion and prostration, in which ordinary incidental diseases assumed severe and fatal adynamic characters, were among the most formidable sequelæ.

No part of the army escaped. The new levies on the Pacific slope suffered as well as the great armies of the central basin and the Atlantic coast. The disease, however, was most formidable, and produced the greatest mortality in the valley of the Mississippi and its tributaries.

In this region, and especially in Missouri, and in the army of the Ohio, measles very frequently assumed a typhoid character, and petechial spots made their appearance, constituting what was generally designated as black measles, a condition which was comparatively rare on the Atlantic coast.

The statistics of the expeditions to North Carolina, South Carolina, and the Gulf would make it appear that these regions had almost completely escaped. This, however, was simply owing to the fact that the regiments composing these expeditions had, as a general rule, suffered from the epidemic at some prior portion of their history.

Measles prevailed most actively during the fall, winter, and spring of 1861–62, but it still occasionally occurs among freshly raised regiments and recruits. Should large levies be at any time again brought into the field there is every reason to believe the disease will again prevail. This probability, as well as the historical interest of the epidemics which have hitherto occurred, make the discussion of camp measles a subject of considerable importance.

Symptoms.—The general symptoms and course of measles—as it occurs usually among children in civil practice—are well known to every medical reader. The preliminary fever, with its accompanying catarrhal affection; the characteristic eruption on the fourth day, without any diminution of the febrile reaction; and the general decline of all the symptoms four or five days subsequently, are described in all the elementary works on practice, and are familiar to most students of medicine from personal observation. As it occurs among troops, measles pursues the same

general course, and presents, in the main, the same train of symptoms. Simply it is a much severer affection, and this severity is exhibited chiefly by its assuming a more adynamic character than is usual in private life.

The preliminary fever may begin abruptly by a chill, followed by fever, with the subsequent development of coryza, injection of the eyes, redness and soreness of the fauces, a sense of constriction across the chest, cough, and other symptoms of catarrh, or the catarrhal symptoms may precede the febrile stage for a variable period.

The eruption usually makes its appearance on the fourth day of the fever, but this is not invariable; occasionally it occurs earlier or later in the course of the disease. It generally appears first on the face and front of the chest in minute red points, which have been compared to flea-bites, appearing on the rest of the trunk and the extremities a day or two later. The spots increase in size, and in from twenty-four to forty-eight hours attain a diameter of an eighth, a quarter, or even a half inch. Frequently they are aggregated together in patches, in which the spots are more or less confluent. In this condition they are not unlike the eruption in the early stage of confluent smallpox. The eruption is usually of a dusky reddish color, slightly elevated to the touch, the redness disappearing more or less on pressure, and sluggishly returning when the pressure is removed.

In the most adynamic cases the eruption is of a livid, reddish, or blackish purple, scarcely modified by the pressure of the fingers. This is the variety

which has been described as rubeola nigra, or black measles, and is particularly fatal.

It has been mentioned that the fever and catarrhal symptoms, so far from disappearing on the development of the eruption, are rather increased in severity. This is one of the points of diagnosis from smallpox, the resemblance to which has been mentioned; for in smallpox, except in the worst confluent cases, the febrile symptoms not only greatly diminish, but often altogether disappear when the eruption occurs.

The catarrhal symptoms frequently assume the severity of decided bronchitis; the pulse becomes frequent and feeble; the prostration often extreme, with jactitation, restlessness, insomnia, or even delirium. During this stage severe and fatal symptoms often make their appearance. Violent congestions of the lungs are not uncommon; or adynamic pneumonia may set in with variable result, which, however, is not so common as at a later period. Dangerous cerebral symptoms, intense delirium, stupor, or coma not unfrequently occur, and often immediately precede a fatal result.

In favorable cases the symptoms begin to decline about the fourth day of the eruption. The eruption becomes paler and gradually fades, until, in the course of three or four days, it disappears altogether, its disappearance being followed by a more or less complete desquamation of the cuticle. The febrile symptoms simultaneously subside, but the bronchial affection, although declining, is usually protracted to a somewhat later period.

The patient is generally left extremely debilitated, and his skin is peculiarly susceptible to the impres-

sion of cold, so that the slightest exposure is apt to be followed by an aggravation of the bronchial symptoms.

It is at this period that adynamic pneumonia most frequently sets in, and from its severe character and the debilitated condition of the patient is exceedingly fatal. In other cases tuberculous formations are developed in the lungs, and the attack terminates in acute tuberculosis or in ordinary phthisis pulmonalis.

Varieties in the progress of the disease are not uncommon. Sometimes, though rarely, the catarrhal symptoms are altogether wanting. Much more frequent is the absence of the eruption, or its more or less complete retrocession before it is fully established. This event is very generally followed by severe cerebral symptoms, by pulmonary congestions, or by pneumonia.

The adynamic character of camp measles is manifested in the frequent and feeble pulse, the great prostration which accompanies the progress of the disease, the subsequent debility, and not unfrequently by the occurrence of a brown, dry tongue, with more or less sordes about the gums and teeth, as in the case of typhous diseases generally.

The catarrhal affection and pneumonia which accompany measles do not differ in any essential particular from the ordinary camp catarrhs and pneumonias described in a subsequent chapter. Their detailed consideration may therefore be postponed.

Congestion of the lungs is indicated by sudden aggravation of the difficulty of breathing, with uneasiness or dull pains in the chest, and slight dullness on percussion in the posterior parts of the lungs, but

without the crepitant rale of the early stages of pneumonia or the bronchial respiration of the hepatized lung. It is accompanied by more or less lividity or blueness of the surface, the result of deficient aeration of the blood. In fatal cases the dyspnœa and prostration become extreme, and the patient expires asphyxiated.

The tendency to cerebral symptoms is marked. Even in ordinary cases a certain amount of dullness and hebetude of mind, of jactitation, restlessness, delirium, or stupor is of frequent occurrence. But in a class of cases which are sufficiently common, the stupor becomes extreme, and the patient early passes into a state of coma, from which it is difficult, and sometimes impossible to arouse him.

Prognosis.—This affection is always serious, often fatal either directly or through its sequelæ. The prognosis therefore should be guarded. Nevertheless, with judicious management a large majority of the cases will recover.

Diagnosis.—Camp measles, as it ordinarily appears, can hardly be confounded with any other disease except the early stages of smallpox or varioloid. In cases in which the eruption is suppressed, however, it might be mistaken for typhoid fever, ordinary congestion of the lungs, or pneumonia. These errors are generally of little importance, as they necessitate no essential modification of the treatment. In the case of smallpox, however, it is important to recognize the true nature of the affection, in order that prompt means may be taken to isolate the patient. As already hinted, the subsidence of the fever on the appearance of the eruption will generally enable the

surgeon to distinguish smallpox, and in severe confluent cases, where the fever does not subside, the vesicular character, which the eruption usually assumes within twenty-four hours after its appearance, will render the diagnosis easy.

Causes.—There can be little doubt that measles once developed is propagated by a peculiar contagion. Numerous instances have occurred during the present war in which the exposure of a single soldier to the cause, and his subsequent attack by the disease, have been followed by its spread through a whole regiment or brigade.

At the same time it must be admitted that measles has frequently appeared in encampments in which it have been impossible to trace any such cause for its origin. And it is necessary to acknowledge that although readily spread by contagion when once established, the disease may take its origin *de novo* under conditions which are not well understood, and which have recently been made the subject of interesting and curious investigation.

Dr. J. H. Salisbury, of Newark, Ohio, has propounded the theory that measles is essentially due to the action upon the human system of a peculiar fungus, which is developed in straw, under the influence of warmth and moisture. He affirms that he has artificially produced measles, or a disease closely resembling it, by the inoculation with this fungus, and quotes a number of facts, which appear to him to justify him in his theory. Prominent among these appears the following statement. After describing an attack of what he regards as measles occurring in

a Mr. Dille, immediately after thrashing some decayed wheat-straw, he says:—

"At the military camp (Camp Sherman) Newark, Ohio, the measles first appeared on December 4th, the same day that Mr. Dille exposed himself to the straw-dust. From November 23d to 30th the weather was cool, damp, with considerable sleety rain and snow. During this time (there being between six and seven hundred men in camp), many of the tents were furnished with ticks, which were filled with straw for the men to sleep on. In the center of each tent was a fire, built in a hole in the ground, from which the smoke was led off by an underground flue, extending to the outside of the tent. The straw ticks were arranged around the fire, several in a tent, and each tick accommodated two men. On December 1st, the weather became colder, and snow fell to the depth of about an inch. On the 2d, which was quite warm, this melted and wet the soil and dampened the straw ticks. December 4th the measles made its first appearance in Camp Sherman. The men came from different parts of the country, and no one knew that he had been exposed to the disease. Some had been in camp two weeks, and no one supposed to have that disease had visited the camp. Subsequent inquiries have failed to discover any one who brought it there, or to account for its appearance from the contagion of the disease. On the first day (December 4th) there were eight cases, and within a week after there were forty. The disease then disappeared for ten or twelve days from its first appearance. Between the 14th and 16th the disease again made its appearance, and within a few days there

were between forty and fifty cases more, when the disease ceased altogether. These last cases occurring so near the usual time at which the disease ordinarily makes its appearance after exposure, renders it probable that they were communicated from the first cases. On the 3d of December, it became warm and pleasant, as growing weather in spring, and continued warm and delightful until December 10th. On the 11th and 12th, it was cold and freezing. The 13th and 14th were cool. From the 15th to the 21st, the weather was warm and pleasant."*

This interesting statement appears strongly to confirm Dr. Salisbury's theory of the origin of measles. The question, however, is presented to the inquirer, whether the circumstances detailed were the causes of the outbreak of measles, or only coincident events. However plausible Dr. Salisbury's statements make his theory appear, it cannot be denied that measles has made its appearance among newly raised troops under very different conditions from those which he has described. It has broken out in barrack buildings, where the men laid on the floor on their blankets, without straw. It has broken out in camps, where no straw was furnished to the men, and where they lay on cedar twigs, or on India-rubber blankets. In very many cases, the source of the contagion could be distinctly traced to communication with an infected regiment or individual. In other cases, it is true, this could not be done, and perhaps the supposition of a possibly overlooked source of contagion is inadequate to account for all the instances of this class.

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* Am. Journ. Med. Sciences, July, 1862, p. 20.

Here is encountered that *quid ignotum* which underlies so many medical problems; and the solution of Dr. Salisbury is far from meeting all the phases of the difficulty.

For example, camp measles has prevailed almost exclusively in the regiments raised in rural districts, while those from cities and towns have been more or less completely exempt. In the same manner regiments composed of foreigners have been almost totally exempt. The explanation of these facts is simple. The exempt were those who had the disease prior to their entry into the service. Those who had hitherto escaped were the sufferers. The inference is inevitable that recruits from the country have generally escaped the disease before their enlistment, while those from towns have usually suffered from it at some previous period. Personal inquiry in regiments where measles is prevailing speedily shows this inference to be correct. As a rule, the exempts recollect their previous attack, or if it took place at too tender an age for personal recollection, they have heard it said by their relatives that they had the disease in infancy. As a rule, also, those who suffer from the disease remember no previous attack; often are quite positive, from the testimony of relatives and friends, that they could not have had the disorder. In fact, a second attack of measles appears almost as rare as a second attack of smallpox.

If, now, Dr. Salisbury's theory is correct, if the straw fungus is the veritable cause of measles, how does it happen that this disease is more common in the towns than in the country? How does it happen that so many thousands of recruits from the remote

rural districts have escaped the disorder through youth and adolescence?

The straw fungus which Dr. Salisbury has described is no new discovery, as he seems to imagine, and is far more widely disseminated than he appears to suppose. It is a form of penicillium of the most frequent occurrence, and is widely distributed throughout the country. The personal observations of the author have shown him that it is formed abundantly in every stable where straw is used as bedding, in every wheat sheaf or stack of grain which stands exposed to the weather. If Dr. Salisbury's views are correct, every thrashing floor and stable should be a focus from which the disease should originate and spread. How do those farmers' children who play continually among the ricks of grain happen so often to reach manhood unscathed by an affection to the cause of which Dr. Salisbury would teach us they are continually exposed?

But graver doubts are thrown upon the value of Dr. Salisbury's conclusions by an attempt to repeat his experiments. It is easy enough to make the straw fungus, but not so easy, by inoculating with it, to produce any of the effects which appeared to follow the inoculation in his hands.

Since reading Dr. Salisbury's paper, the author has several times produced the straw fungus by shutting up damp straw in a box, as proposed in that essay, and has inoculated with the fungus a number of persons, among others himself, Acting Assistant Surgeon Curtis, U. S. A., and Hospital Steward Whitney, U. S. A., without, however, producing any perceptible

effect, except sometimes the formation of a little ulcer at the point of inoculation.

The fungus used in these experiments was produced in the same manner as that used by Dr. Salisbury, and was identical with it in microscopical characters.

It must be freely admitted that negative results, such as these, cannot contradict positive ones, if the latter have been correctly observed; but there is a source of error in Dr. Salisbury's observations; they were made during the prevalence of an epidemic of measles. How far were the effects he imagines to be due to the fungus the result of the epidemic?

Certainly additional observations under other conditions are necessary before his conclusions can be generally accepted.

Treatment.—Measles is to be regarded as a self-limited disease, which terminates in consequence of its own internal laws, and cannot be cut short by any therapeutic measures at present in our possession. The treatment therefore consists essentially in combating the various complications, and in supporting the sinking powers of life, until the violence of the disease is spent.

The preliminary fever is to be treated with mild saline diaphoretics, muriate of ammonia, citrate of potassa, or solution of acetate of ammonia. Mild purgatives should be employed if the bowels are constipated. Compound extract of colocynth, combined with podophyllin, compound rhubarb pills, castor oil, or sulphate of magnesia will answer well for this purpose. Brisk purgation should be avoided. Any alterative influence it might exert on the progress of the disease is more than counterbalanced by its de-

bilitating effect, which the adynamic character of the disorder renders especially injurious.

The cough, if severe, calls for treatment especially addressed to the bronchial affection. Syrup of ipecacuanha, in teaspoonful doses, given every two hours, answers a good purpose in this condition; or the muriate of ammonia may be given in the dose of five to ten grains in solution every two hours. Opiates should be avoided in this early stage, as tending to check secretion. Yet if there is restlessness and sleeplessness at night, opium combined with ipecacuanha, in the form of Dover's powder, may be given in full doses to procure sleep.

After expectoration is fully established, the more stimulating expectorants may be resorted to, such as squill and seneka, which may be given separately or combined in the form of syrup. Opiates may be introduced into the combination in moderate quantities to allay cough, or may be given to procure sleep at night.

If the prostration becomes marked with frequent and feeble pulse, as very often happens toward the close of the first week or even earlier, tonics and alcoholic stimulants should be resorted to. Tincture of bark or quinia, in two-grain doses, alone or in combination with iron, may be used as tonics. Wine-whey and milk-punch are the most available forms for the exhibition of stimulants. In typhoid cases, with much heat of skin and congestion of the surface, chlorate of potassa, in the dose of ten grains every two hours, is a valuable remedy.

The various complications of the disease require special attention in the treatment. The details of

the treatment of severe bronchitis or of pneumonia need not be given in this place. It does not differ in any respect from that of simple bronchitis and pneumonia, as detailed in subsequent chapters, to which the reader is referred.

Retrocession of the eruption, followed as it generally is by severe symptoms, requires prompt measures to induce its reappearance. The hot bath, mustard pediluvia, sinapisms, and warm drinks are among the most efficient measures for this purpose.

Intense cerebral symptoms, as stupor and coma, are to be met by cold to the head, dry cups to the nape of the neck, hot pediluvia, and sinapisms to the extremities. These symptoms are to be regarded as evidences of disordered action, resulting from the general adynamic condition rather than from local inflammation. Even should there be, however, unmistakable evidence of meningeal inflammation, bleeding and mercurials must not be resorted to. Far more dangerous in themselves, they are less efficient in their results than the simple treatment above indicated.

If these cerebral disorders are accompanied by scanty urine, the happiest results will accrue from the use of diuretics, such as digitalis and acetate of potassa. Digitalis is especially useful, as it not only acts upon the kidneys, but at the same time diminishes the frequency and force of the pulse.

Congestion of the lungs is to be treated by the warm bath, by dry cups over the posterior surface of the chest, by hot pediluvia and sinapisms to the wrists and ankles. Neither in this condition nor in the cerebral states alluded to in the last paragraph

should any false pathological notions prevent the use of alcoholic stimulants, if the condition of the pulse indicates their employment.

The diet requires careful attention throughout the complaint. As in other adynamic diseases, it should be nutritious and readily digestible. During the first violence of the febrile movement, farinaceous drinks, such as barley-water or toast-water, or plain toast and tea, are usually sufficient for the wants of the economy. But when adynamic symptoms develop themselves, no matter at what stage of the complaint, more nutritious food is demanded. Wine-whey or milk-punch, meat-broths, beef tea or beef essence, and other forms of simple but nourishing food, are to be resorted to in the same manner and under the same general restrictions as in the case of typho-malarial fever. The reader is referred to the chapter on that disease for full details as to the management of the diet, all that was said in that place being fully applicable to the affection under consideration.

When convalescence has set in, the exposure of the patient to cold and moisture should be carefully avoided, as almost certain to lead to severe disorder of the respiratory organs. The patient for this reason should not be returned to duty for several weeks after desquamation is complete, nor then unless all cough and symptoms of thoracic trouble have entirely disappeared.

During the debility which follows the disease, the bitter tonics, such as bark and gentian, with a full and nutritious diet, should be employed, and chalybeates may be used in cases in which the peculiar pallor indicates an anæmic condition.

Throughout the whole complaint its extreme tendency to assume an adynamic character should be borne in mind, and all debilitating remedies should be scrupulously avoided.

The incidental sequelæ are to be managed in the same manner as would be advisable if they occurred in any other connection, or as independent affections.

By adopting this general plan of treatment, the mortality from this disease may be very greatly diminished, and a favorable result will be secured in the vast majority of cases.

CHAPTER VIII.

CATARRH.

CATARRHAL affections have been exceedingly common among our troops, over a hundred and twenty-five thousand cases having been reported during the first year of the war. They were most frequent during the fall, winter, and spring, and especially during the winter months, precisely in the reverse of diarrhœa, which attains its maximum during the summer. They have occurred both as independent affections, and as a complication or consequence of camp measles. Closely resembling in all the local symptoms the bronchial disorders of civil life, catarrh, as it occurs among troops, presents the general adynamic characters of other camp diseases. It comes thus to resemble influenza more closely than ordinary catarrh, and this similarity is increased by the fact that large numbers of cases occur simultaneously, giving it an epidemic character.

Unlike other camp diseases, catarrhal affections prevailed with almost equal frequency in the three great geographical regions, there being but a very slight preponderance in the Atlantic over the central, and in this over the Pacific region. The table shows at a glance the course of the disease in each of these regions.

Monthly Rates of Catarrhal Affections in the Armies of the United States during the year ending June 30th, 1862, expressed in ratio per thousand of mean strength.

1861.						
	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Atlantic border.....	23·94	23·56	23·91	32·56	49·36	59·02
Central region	12·81	16·25	25·51	31·23	45·73	63·88
Pacific border.....	9·08	14·42	24·05	25·35	40·61	29·73

1862.							
	Jan.	Feb.	March.	April.	May.	June.	For the year.
Atlantic border.	61·64	53·84	39·88	29·00	14·94	11·33	456·47
Central region..	78·73	49·43	49·74	28·07	14·21	11·71	427·20
Pacific border...	43·09	77·46	46·31	12·77	15·55	17·35	407·61

Symptoms.—The disease sometimes commences with slight soreness of throat, with coryza, or with an uneasy sense of constriction in the chest; sometimes a slight cough is the first symptom. At other times febrile symptoms set in as an initiatory phenomenon, and cough makes its appearance subsequently.

In the great majority of cases, the patient presents himself at sick-call laboring under a dry, short cough, with more or less thoracic uneasiness. There is often more or less coryza, with suffusion of the eyes and some soreness of throat. He complains of sensations of chilliness, alternating with flushes of heat; sometimes a decided febrile action is present. The pulse is moderately accelerated, and is more or less compressible. The respiratory movement is also increased in frequency. The patient complains of lassitude and debility; generally he is unable to do duty. Sometimes the prostration is such as to compel him to keep the recumbent position. The bowels are generally constipated, the urine scanty, and not unfrequently there is an icteroid hue of the conjunctiva, or of the whole countenance. The expectoration is viscid, whitish, more or less transparent and scanty, occasionally streaked with blood. As the disease progresses, the febrile phenomena usually subside, but the pulse retains its frequency and feebleness, and the loss of strength becomes more palpable. In the course of four or five days the cough usually becomes looser and less painful, the expectoration more copious and opaque, and after a time yellowish or greenish yellow, from admixture with pus. In the most favorable cases, the disease now gradually abates, the cough and expectoration diminish, and in the course of ten days or two weeks entirely disappear, leaving the patient well, though somewhat debilitated by the attack.

In the severer form of the complaint, however, although the febrile reaction diminishes, the cough continues, with more or less copious expectoration,

and often for a considerable period. The patient is, moreover, liable to relapses after slight exposures, the cough becoming again hard and dry, the secretions scanty, and fever once more making its appearance. Under such circumstances pneumonia not unfrequently sets in, especially in those cases which are consecutive to measles.

There is, moreover, a class of cases which, beginning with great acuteness and intensity, run rapidly into congestion or into collapse of the lungs, and frequently with fatal result. The same accidents may also occur at almost any period in the course of adynamic cases.

Congestion of the lungs has already been briefly described in connection with the subject of measles, and the account there given essentially applies to it under the circumstances now considered. It is recognized by the sudden oppression and dyspnœa which it produces, the intense congestion and livid blueness of the face and general surface, accompanied by high febrile reaction, great prostration, often delirium, and followed by pallor, sinking, apnœa, and death. The physical signs are suddenly induced, and general dullness on percussion, with moist subcrepitant rales, especially over the lower and posterior portion of the lungs.

Another frequent and perhaps still more fatal accident is *collapse* of a portion of the pulmonary tissue. This accident is usually indicated by the breathing gradually becoming laborious, until finally intense dyspnœa, with an aggravation of all the constitutional symptoms of the disease, results. In other cases, however, the same condition comes on suddenly as in congestion of the lungs, the general symptoms

of which it very much resembles. The physical signs, however, will generally enable a diagnosis to be made between these two conditions. In both there is dullness on percussion, coextensive with the area of the mischief; but in collapse of the lung, as the air does not enter the affected portion, there is a total absence of respiratory sounds, instead of the subcrepitant rales of the congested lung. Collapse of the lung is usually due to the more or less complete obstruction of one of the bronchial tubes by the thickened secretions. In this condition, although a partial escape of air takes place through the obstruction during expiration, none enters during inspiration, and the portion of lung to which the affected tube proceeds is thus gradually collapsed. The mischief will of course vary in extent with the size of the tube involved. It may be limited to a single lobule, or may affect one or more lobes of either or both lungs; in the latter case, the lower posterior portions of the lungs are most frequently involved. That this accident, which appears to be but little known and comparatively seldom recognized, is much more common than is usually believed, is proved by the frequent occurrence in fatal cases of the post-mortem appearances of collapse of the lung, which will be hereafter described. When limited to a small portion of the lung, it does not usually interfere with recovery, and frequently is only suspected after careful physical examination; but where large portions of the lungs are involved, it is generally fatal.

A few remarks may now be made with regard to each of the leading symptoms of catarrh.

The *cough* is usually hard and dry in the early stages of the disease; frequently it is accompanied by

cutting or tearing pains in the chest. In many cases it is most severe in the night, depriving the patient of his accustomed rest. In the more advanced stages it becomes loose and comparatively easy, and often ceases altogether to produce serious annoyance for some time before it ultimately disappears.

The *expectoration*, at first whitish, clear, viscid, and scanty, becomes gradually more opaque and abundant. After a time it assumes a yellowish or greenish-yellow muco-purulent aspect. Not unfrequently it is streaked with blood. Examined microscopically in the early stages, it will be found to contain abundant ciliated epithelium from the bronchial tubes, a considerable number of the so-called mucus corpuscles, with pavement epithelium and other elements from the oral cavity. In the later stages the ciliated epithelial cells become much fewer, and are even absent altogether — the mucus corpuscles (pus corpuscles?), which are present in vast numbers, being now the chief elementary forms, with the exception of such as are derived from the oral cavity. Red blood corpuscles are usually present in variable quantity, according to the greater or less admixture of blood with the specimen. Concerning the nature of the mucus corpuscles above referred to, considerable diversity of sentiment exists among pathologists, some having gone so far as to affirm specific differences in form between the mucus and the pus corpuscle, and to attempt to make these imaginary points the basis for a differential diagnosis. Modern histological investigations have, however, shown that the attempt to set up distinctive characters between the mucus and pus corpuscles is futile, and that in fact these

bodies are not only similar in form and in chemical reaction, but have the same origin, both being derived, in the inflammations of mucous membranes, from the multiplication of the deeper-seated epithelial cells. The distinction between mucus, muco-pus, and pus in the catarrhal affections of mucous membranes, is to be sought therefore in the physical and chemical characters of the fluid in which the corpuscles float, and not in any specific characteristics of the corpuscles themselves.

When the fluid is tenacious, colorless, transparent, or slightly opaque and whitish, with more or less abundant epithelial elements, and few or none of the so-called mucus corpuscles, it is to be designated mucus.

When yellowish or greenish yellow, with little or no epithelium, and abundant corpuscles, but tenacious, tough, stringy, and but little miscible with water, it should be called muco-pus.

When the abundant corpuscles float in an albuminous serum, and are readily miscible with water, the name should be pus.

These brief definitions are presented, because there appears to be, in the accepted text-books and in the professional mind, a degree of uncertainty on this very simple subject. For the same reason the following brief description of the characteristics of the corpuscles referred to is added.

The mucus or pus corpuscle, for it may be called indifferently by either of these names, is a spherical granular corpuscle, varying in diameter in different specimens and in the same specimen from one three-thousandth to one two-thousandth of an inch; perhaps one twenty-eight hundredth of an inch may be

stated as an average. With careful examination one or more nuclei can usually be made out without the addition of reagents. On the addition of distilled water these become still more distinct, and not unfrequently the cell wall is raised up as a thin, bladder-like membrane. Acetic acid causes the cell contents to become transparent, and shrivels the nuclei into a number of dark contoured, oval, or biscuit-shaped bodies. Occasionally no nucleus is observable, and sometimes black pigment, in fine granules, is present among the cell contents.

The origin of these corpuscles from the lower layers of the epithelium of the mucous membrane has already been indicated.

The *febrile reaction* may be altogether absent, or it may be a prominent symptom from the very first. It is generally severe in proportion to the acuteness of the attack and the extent of the respiratory tract involved. Usually it subsides in the course of the first week, and does not reappear except in case of a relapse.

The condition of the *alimentary canal* is variable; usually the bowels are constipated, but sometimes diarrhœa is present, and occasionally there is nausea and vomiting, especially during the early period of the attack.

As previously remarked, the chief point which distinguishes this disease from the catarrhal disorders of civil life, is its adynamic character. This is shown by the debility and prostration which accompany it, by the symptoms of nervous disorder frequently present, such as headache, pains in the back and limbs, sometimes giddiness, dimness of sight, or dull-

ness of hearing, mental hebetude, occasionally low delirium.

The *physical signs* are of the utmost importance in the differential diagnosis.

In uncomplicated catarrh there is little or no dullness on percussion throughout the complaint. The chest expands uniformly and equably on both sides, but after the disease is fairly established, less fully than in health, while the abdominal movements of respiration are exaggerated. On auscultation, during the earlier stages, the respiratory sound is found to be dry and harsh, passing ultimately into the dry bronchial rales. These are the *sonorous rale*, which is a musical note, comparable somewhat to the sound of a flute, and the *sibilant rale*, which, as its designation indicates, is a whistling sound. The former is chiefly heard when the large bronchial tubes are involved. The latter when the smaller tubes are affected. The two are not unfrequently heard together. After free expectoration is established, these sounds are modified, and are replaced by the moist rales. These are especially the *mucous rale*, which results from the passage of air through the liquid secretions contained in those tubes which when dry give rise to the sonorous rale, and the *submucous*, caused by its passage through the secretions contained in smaller tubes.

For details as to the characters, causes, and significance of these sounds, the reader is referred to the works on auscultation and percussion. The physical signs of *congestion* and of collapse of the lung have already been given.

Pathological Anatomy.—The post-mortem appearances of catarrhal inflammation of the bronchial

tubes are redness and thickening, sometimes softening of the mucous membrane, the air-passages containing more or less abundant muco-purulent secretion. The lung, however, crepitates on pressure, and floats if thrown into water.

Congestion of the lung is shown after death by the intense dark redness of the pulmonary tissue, which is gorged with dark blood that freely escapes from incisions. It is, moreover, often softened, so that the finger passes through it with preternatural facility. The lung still floats if thrown into water.

In collapse of the lung, the collapsed portion is palpably diminished in size, is of a dark-red color, sinks in water, and presents a peculiar aspect, which has been described as carnification, and which once seen will readily be distinguished from the hepatized lung of pneumonia. Very often the carnified lung can be artificially inflated by means of a pair of bellows. If, however, the condition is of long standing, this is not always possible. The surface of a section is fleshy, and presents none of the granular appearance of pneumonia. The luxuriant cell multiplication of the pulmonary epithelium, which will be hereafter described as characteristic of pneumonia, is also wanting.

All the conditions above described may coexist in the same lung: the upper portions giving the characters of ordinary bronchitis, the lower posterior part presenting well-marked congestion, while a portion, of variable extent, may be collapsed. Such a condition is frequently observed in fatal cases of measles and typho-malarial fever, as well as in ordinary cases of fatal catarrh.

Occasional complications with pneumonia, pleurisy, or tubercular deposits of the lungs may also be observed in fatal cases; and of course in cases of typho-malarial fever, the usual intestinal phenomena are to be anticipated.

Causes.—Exposure to damp and cold are undoubtedly among the most frequent causes of this complaint. It is probably less frequently the result of exposure to rain and bad weather in the course of the day than of laying down to sleep in wet clothes and on the damp ground at night. But other causes undoubtedly co-operate, and these are especially the usual influences which provoke and aggravate other zymotic diseases. Overcrowding and imperfect ventilation, want of cleanliness, and general police, the debility consequent upon the monotonous diet of camps; whatever, in short, induces debility renders men liable to the inroads of catarrh under favorable conditions. Troops overcrowded in ill-constructed and badly-ventilated temporary barracks, seemed during the winter of 1861–2 to suffer more from the disease than those who were encamped in suitable tents; and those in tents, with tent stoves, certainly suffered more than did the troops in the winter of 1862–3 encamped under the simple tenté d'abri, with such accessory shelter as could be extemporized by moderate ingenuity from brush, bark, and mud. Stoves heated by wood fire in small crowded tents appear particularly objectionable. The men congregate in the tents during the evening, build up hot fires, and lay down to sleep in a stifling atmosphere; during the night the fires die out, the tents become thoroughly chilled, and in the morning the soldiers wake up shivering, dress, and go

out to duty in the cold. There can be little doubt that this mode of life has been the cause of a large part of the catarrhal disease of the army. Far less objectionable are the California furnaces, so called, which are pits for the fire dug in the ground, either inside or outside the tents, the smoke being carried off by an underground trench passing through the tent to a chimney beyond; the ground thus becoming thoroughly heated, and cooling down slowly after the fire has died out, there is far less likelihood of the sleepers being chilled toward morning.

The influence of atmospheric conditions on the development of these affections is too palpable to be possibly overlooked; not only are they rare during the warm and frequent during the colder months, but protracted periods of cold and rain, or damp weather, are palpably accompanied not merely by an aggravation of the symptoms of existing cases, but by the development of new ones. Every medical officer who has had any field experience will have noticed the rapid amelioration of the symptoms in his cases of catarrh during fine, clear, dry weather of any duration.

Treatment.—The treatment of catarrhal inflammation of the respiratory organs necessarily varies with the severity of the attack and with the several stages of the disease.

In the simplest form, a mild cathartic, followed by the use of quinia and iron or the bitter tonics, will often suffice. More energetic treatment, however, is required in decided cases. As the disease usually appears accompanied by more or less febrile reaction, with hard, dry cough, and scanty expecto-

ration, its general management may be outlined as follows:—

During the first stages of the febrile reaction some mild diaphoretic may be administered, such as muriate or acetate of ammonia or citrate of potassa; with this an expectorant should be combined, if the cough is hard and dry. Syrup or wine of ipecacuanha is perhaps best suited for this purpose. If there is much heat of skin and frequency of pulse, tincture of digitalis may be added to the mixture, five or six drops being combined with each dose. Antimonials, so generally employed in private practice in the early stages of bronchial affections, are to be regarded as out of the question.

The tendency of the disease itself is decidedly toward debility, and it would be folly to increase this tendency by the injudicious use of so depressing an agent as antimony.

For the same reason frequent purgation is to be avoided. It cannot cure the disease, and by exhausting the already enfeebled patient may do much to aggravate his subsequent condition. This objection does not, however, obtain against moderate laxatives, which may be used without hesitation if constipation exists.

If there is restlessness and sleeplessness at night, full doses of Dover's powder may be given at bedtime, but as a general rule it is best to limit the use of opium as much as possible during the early period of scanty expectoration. After expectoration is fully established, the more stimulating expectorants, especially squill and senega, may be employed. They may be used in the form of syrup, alone or together, and

are advantageously combined with the camphorated tincture of opium, or with some preparation of morphia. Various cough mixtures may be prepared by combining these ingredients with each other, and with demulcents, especially with syrup of acacia, or with the aqueous solution of the extract of liquorice. The precise combination the physician may choose to employ is of little moment, provided it contains enough of the expectorant to produce a decided impression without exciting nausea, and but a small quantity of opiate, just sufficient to moderate the cough. The dose should be so graduated that it may be taken every two, three, or four hours during the day, and through the night also if the patient is roused from his rest by violent attacks of cough. In protracted cases, with copious expectoration, the fluid extract of cubebs will occasionally be found very useful; it may be given in the dose of twenty minims, mixed with a little sugar and water, every three or four hours. Copaiva is also an excellent remedy in this condition, although its nauseous taste and smell will prevent its general use; it may be administered in drachm doses, three or four times daily.

In the protracted use of expectorants in catarrhal cases, the surgeon must, however, be on his guard, lest by interfering with the condition of the stomach he diminish or destroy the appetite, and thus indirectly add to the debility which already exists. The prostrate condition of the patient creates, indeed, an important indication for tonic and supporting treatment at an early period in the majority of cases. The simple bitters may be given, alone or combined with

the cough mixtures, to meet this indication; or if the degree of debility is such as to call for more decided measures, quinia and iron or even alcoholic stimulants should be resorted to.

The local treatment is of considerable importance. In acute cases, with fever, thoracic pain, oppression, and hard dry cough, local blood-letting, by cups or leeches, is recommended in most of the standard treatises. In the form of the disease which occurs in the army, however, this treatment is out of the question; although it may appear in some cases to afford temporary relief, it exercises no visible effect on the ultimate duration or severity of the disease, and is likely to do mischief by increasing the subsequent prostration. Quite as much benefit, without the same objectionable consequences, will result from the free use of dry cups to the chest. They should be applied over the seat of greatest pain or soreness, and may be repeated if one application does not afford relief. Sinapisms to the chest or rubefacient liniments are also frequently of advantage, and in the advanced stages of protracted cases benefit will result from the application of croton oil or flying blisters.

If the febrile movement of the first stage continues and a typhoid condition sets in, the general treatment of camp fever already detailed should be resorted to.

Sudden congestion of the lungs is to be treated with sinapisms to the extremities, mustard pediluvia, dry cups to the posterior region of the chest, and the judicious employment of stimulants.

Symptoms of collapse of the lungs should be treated by the inhalation of the warm vapor of water, by emetics, in the hopes of expelling any mucus that

may be obstructing the bronchial tubes, and by stimulants.

In cases in which an icteroid hue of the countenance, anæmia, and the general symptoms of malarial poisoning develop themselves, quinia and iron should be freely employed, with the administration of mild laxatives, or of nitromuriatic acid, if the condition of the liver calls for them.

In chronic cases, tonics, full diet, and the moderate use of stimulant expectorants are the appropriate remedies.

The *diet* in camp catarrhal affections should be regulated on the same general principles which should guide in the management of other acute camp diseases.

During the first few days of the febrile reaction in acute cases, a low diet is advisable; demulcent and mucilaginous drinks, such as barley-water, flaxseed tea, toast-water, and gum-water, may be employed with advantage. Sometimes the patient wants nothing more; but where there is a desire for solid food, toast and tea, panada, soaked crackers, or other farinaceous food may be employed.

In the course of a few days, however, with the subsidence of the febrile reaction, or with the development of adynamic symptoms, more nutritious food is required. Animal broths, beef tea, or beef essence may be employed, combined, in accordance with the needs of the case, with wine-whey or milk-punch. After the complete subsidence of the fever, and especially in protracted or chronic cases, full diet should be resorted to; well-cooked fresh meat and vegetables, and nutritious soups, with malt liquors, are especially desirable.

CHAPTER IX.

PNEUMONIA.

INFLAMMATION of the lungs has been exceedingly common and very fatal among the troops during the present war: 11,061 cases were reported prior to July, 1862, of which 2134 died—a mortality which does not differ materially from that of the affection in the Crimean war, during which, of 590 cases reported among the English troops, 161 died.

The disease has occurred as an independent disorder, and as a sequel or complication of catarrh, measles, and typho-malarial fever, or of other diseases. Its high mortality, about one to every five cases, is alarming when contrasted with such statements as those of Bennett, who gives a mortality of one to every twenty-six cases in the hospital under his care. This would appear to indicate either, on the one hand, an unusual severity for the complaint, or, on the other, some radical defect in the method of treatment.

Symptoms.—In uncomplicated cases, the disease begins with a short, dry cough, associated with more or less dyspnœa, a dull, heavy pain in the chest, and fever. Sometimes the febrile reaction, which usually commences abruptly by a chill, precedes by a day or so the local symptoms. When pneumonia occurs as

a complication of other affections, it is also generally ushered in by a chill, followed by fever, or, if febrile symptoms are already in existence, by their aggravation. Sometimes, however, especially in catarrhal cases, the symptoms become by degrees more and more severe, and gradually assume the pneumonic characters.

The febrile reaction from an early period, often from the very first, manifests an adynamic character—the frank so-called sthenic cases spoken of so generally in the books having been seldom if ever observed among our troops. The pulse is frequent and feeble from the beginning, or rapidly assumes these characters as the disease progresses; and the tongue, which was at first coated with a whitish fur, is apt to become brown and dry. Delirium not unfrequently occurs at an early period, and is still more frequently present during the later stages of severe cases. Occasionally fierce and maniacal, it is most generally low and muttering as in other adynamic affections.

The cough is at first hard and dry, the expectoration a scanty, tough, whitish mucus, becoming in the course of a few days more copious. It is exceedingly tenacious and viscid, and reddish brown or brownish in color, from intimate admixture with altered blood. This constitutes the renowned rusty sputa of pneumonia. As the disease progresses, the characters of the sputa undergo a change. Sometimes they become slightly more fluid and yellowish, then gradually diminish in quantity until they entirely disappear. This course, which is accompanied by a looser cough, by amelioration of all the symptoms and ultimate recovery, occurs only in the most favorable cases. In

others the expectoration gradually becomes copious and purulent, and the cough looser and less painful. But it very often happens that the sputa, while becoming more liquid after the first few days, retain a dingy-brown color, and sometimes an offensive odor. These cases frequently terminate fatally before the character of the sputa is further changed; but if the patient is to recover, the sputa, even in these cases, become ultimately more or less yellowish and purulent in character as convalescence sets in.

Microscopical examination shows no elements in addition to those described as existing in the sputa of catarrh; the red blood corpuscles, however, instead of being associated into streaks or masses, are intimately intermixed with the morbid secretion. The characteristic differences between the sputa of catarrh and of pneumonia are to be sought rather in the general physical and chemical qualities of the secretions, and in their external appearances, than in the histological characters of the elementary forms they contain.

The respiration is always accelerated in pneumonia. Twenty-five to sixty respirations a minute, or even more, are not uncommon, the normal rhythm being about sixteen respirations in the same time. There is also always more or less dyspnœa and oppression.

The general appearance of the patient, when the disease is fully formed, is quite characteristic. He usually lies upon his back, with his head and shoulders raised by pillows; one or both cheeks are much flushed; the respiration is rapid; the pulse frequent and feeble; and these symptoms, taken in connection

with the short, dry cough, the dull, heavy thoracic pain, and the viscid, rusty or brownish sputa, permit a ready recognition of the complaint, even should the surgeon overlook the physical signs of the disorder, which will be made the subject of a subsequent paragraph.

In the graver cases all these symptoms are gradually aggravated. The fever assumes the typhoid characteristics; the pulse becomes exceedingly frequent; the respiration very rapid; the tongue brown and dry; sordes collect about the teeth; stupor or delirium sets in; and not unfrequently the vital powers give way, and the case terminates fatally in the course of the second or third week, or occasionally at a later or earlier period.

In more favorable cases an amendment takes place, usually some time in the course of the second week, all the symptoms gradually diminish, and the case terminates in recovery after a duration of from three to six weeks, or even longer.

It is stated by Beale that the chloride of sodium disappears from the urine during the stage of hepatization, to reappear as convalescence takes place. The abnormal quantity of the chlorides contained in the sputa is supposed to account for this circumstance.

Physical Signs.—The characteristic physical sign of pneumonia in the incipient stage is the peculiar sound heard, usually on inspiration only, which has been designated the crepitant rale. It has been compared to the sound produced by rubbing the hair between the fingers near the ear. Percussion shows but little alteration in the resonance of the chest. The crepitant rale occurs only in the early stages of

the disorder, before consolidation of the lung has fairly set in. Very frequently the patient is not seen, however, until this stage is passed and the symptoms of consolidation are present. Consolidation of the lung is indicated by dullness on percussion, corresponding with the area of the consolidation. This is accompanied by bronchial respiration, the blowing sounds, caused by the movement of air in the larger bronchial tubes, being conveyed directly to the ear by the great conducting power of the consolidated lung. Preternatural vocal resonance (bronchophony) is also to be observed in this condition.

In a large number of extremely adynamic cases, and especially in those which occur as a complication of typho-malarial fever, the physical signs are somewhat different. Instead of the fine crepitant rale, moist subcrepitant or submucous sounds, accompanied by more or less dullness on percussion, especially in the lower and posterior portions of the lungs, usher in complete consolidation of a large portion of the lower part of one or both lungs, and very many of these cases terminate fatally, or gradually begin to improve before complete consolidation has taken place.

Pathological Anatomy.—The appearances presented by the lungs, after death from pneumonia, vary in accordance with the stage and character of the inflammation. Most generally the disease, as it occurs among troops, is of the form designated as lobar pneumonia, in which a large portion or the whole of one of the lobes, or even a greater extent of lung tissue, is involved. Lobular pneumonia, so called, in which isolated lobules of the lung alone are affected,

must be an exceedingly rare affection among soldiers, if indeed collapse of portions of the lungs, the result of bronchitis, is not the condition usually designated by this name.

The appearances observed in patients dying in the early stages of the disease, while the crepitant rale is heard, belong to what is ordinarily designated as the stage of congestion. In this condition the portion of lung affected is of a deep-red color, does not collapse when the chest is opened, is unnaturally heavy, and though less buoyant than the healthy lung, still floats when thrown into water. It crepitates more or less on pressure, showing that it still contains some air, and often retains for some time the indentation left by the pressure of the finger. It is, moreover, more friable than the healthy lung. In this condition microscopical examination shows the epithelium of the air vesicles to be loosened, so that it is readily detached in preparing portions of the lung for examination. The epithelial cells are enlarged, granular, occasionally showing the initiatory stages of cell multiplication. Chemical examination of the lung tissue shows it to contain an unusual amount of fatty matters.

In examinations made at a later period the lung is found in the state of red hepatization, or of diffused incomplete consolidation, the latter state being especially characteristic of extremely adynamic cases.

In the stage of red hepatization the lung is of a dark, dingy, red color, and so heavy as to sink when thrown into water. It no longer contains air, the vesicles and minute bronchi being filled with a viscid material. Its texture has become very friable, so

that the finger is readily pressed through it in any direction. The cut or torn surface presents a granular structure, and resembles somewhat in its general appearance the texture of the liver, whence the term *hepatization*. The acini-like granules, readily observed with the naked eye, consist each of a group of several of the air vesicles distended with the viscid contents, which will hereafter be described.

In the condition of diffused incomplete consolidation, or *splenization*, as it is sometimes called, which occurs in adynamic cases instead of ordinary red hepatization, the lung is of a dark, livid red, somewhat resembling the spleen. Still softer than in the state last described, the finger can readily be passed through it in every direction; it sinks in water, and contains no air; its vessels are gorged with blood, which freely exudes when a section is made. The characteristic granular appearance of the hepatized lung is, however, not usually present.

Microscopical examination shows the minute processes in hepatization and splenization to be essentially similar. The air vesicles and smaller tubes of the lungs in both are gorged with minute granular cell forms, representing the multiplying epithelial cells of the lining membrane of the tubes and vesicles, and their progeny; binucleated and multinucleated cells are not uncommon. The so-called compound granular cells, resulting from fatty transformation of any of these elements, are also frequently observed. The material in which these forms are imbedded is, however, more viscid and tenacious in hepatization than in splenization.

The lungs of patients dying at a still later stage

present the condition designated in the books as gray hepatization. Except in its color the lung now presents most of the characters of red hepatization, of which this is simply a later stage. A large portion of the minute vessels of the affected part have ceased to circulate blood, and luxuriant fatty degeneration is progressing. Microscopical examination shows the same elementary forms as in red hepatization, but a greater number of compound granular cells are present, and vast numbers of the minuter elements are beginning to resemble pus corpuscles. At a still later period the lung may be found in a state of diffused suppuration, or an abscess may form, or gangrene may set in. The two latter terminations are, however, very rare.

Causes.—The causes described in the last chapter as giving rise to catarrh, acting in a high degree, or on susceptible individuals, are capable in themselves alone of giving rise to pneumonia. The larger number of cases, however, are not uncomplicated, but occur in connection with some other disease. As the affections most frequently associated with pneumonia, protracted catarrh, typho-malarial fever, measles, chronic diarrhœa, and chronic malarial poisoning may be mentioned. In these intercurrent cases it is often not possible to trace the pulmonary affection to any direct exciting cause; of two patients suffering from the same complaint, and apparently exposed to precisely the same conditions, one will suffer from pneumonic complication and the other escape. In simple cases, however, it is generally possible to attribute the disease directly to some exposure as the exciting cause. Pneumonia is most apt to assume a

marked typhoid character in malarial regions, and among troops who suffer from the scorbutic tendency. It has been more common among troops sheltered in houses, or in the ill-constructed wooden barracks so largely employed during the winter of 1861–62, than among those occupying tents. It has been more common in the army of the Potomac and the great armies of the West, than in the expeditions to North and South Carolina and to the Gulf. The troops in Missouri suffered more than in any other region during the first year of the war. Season exercises a marked influence on the frequency of the disease, which prevails chiefly between the months of November and May.

Treatment.—The treatment of pneumonia, as directed in the text-books most widely circulated in this country, may be briefly sketched as follows: Blood-letting both local and general, purgatives, and antimonials in the early stages of the disease; mercurials in the stage of consolidation; expectorants and stimulants in the latter stages, after the expectoration begins to assume a purulent character.

The author is not disposed to enter, in this place, into a discussion as to the general propriety of such a course of treatment. To do so would require more space and time than are here at his disposal, and for the purposes of the present volume this question can be quietly ignored. So far as the treatment of pneumonia in the army is concerned, however, there can be no doubt that the plan above sketched is altogether inadequate, and that it rather increases than diminishes the mortality of the affection. The experience of the last two years permits no other conclusion,

and we are compelled to believe that blood-letting, antimonials, and mercurials are not available for the treatment of camp pneumonia at least, whatever may be affirmed of their efficacy in private practice by those who still cling to the habitual employment of these renowned remedies.

It is not denied that blood-letting, both local and general, is often followed by temporary relief of the symptoms, or that mercurials, like other evacuants, frequently produce an amelioration of the condition of the patient. Cases often do well which have been treated with these heroic agents. But they increase the debility and exhaustion of the latter stages of the affection, and the tendency to exhaustive suppuration, so that a greater mortality follows their use than results from milder and less depressing treatment.

The following general management has been found much more satisfactory in camp pneumonia:—

In the first acute febrile stage of the disorder, the saline diaphoretics should be resorted to; muriate of ammonia in ten-grain doses every two hours, or solution of the acetate of ammonia, or of the citrate of potassa, in tablespoonful doses every two hours, are appropriate for this purpose—the muriate of ammonia being preferable perhaps for most cases. With these digitalis, aconite, or veratrum viride may be combined for the purpose of moderating the frequency of the pulse.

Veratrum viride in the form of tincture may be employed in the dose of two to four drops every two hours, combined with the diaphoretics above named. The dose may be gradually increased, drop by drop, until the pulse is brought down to about eighty beats

a minute, after which it may be diminished or the remedy suspended from time to time, so as not to carry the pulsations below that point. Should the veratrum produce nausea or vomiting, it should be promptly suspended.

This method of treatment has enjoyed considerable popularity: unless most cautiously used, however, it is liable to grave objections. Occasionally it produces distressing nausea and vomiting, and if the effect upon the pulse is not carefully watched, it will sometimes happen that it is pushed far below the normal standard; and even where no nausea occurs, dangerous depression and prostration may result. A long-continued use of the remedy, moreover, is apt to induce debility and exhaustion, even where its effects are carefully watched and the dose regulated with the utmost caution. These objections are very similar to those which lie against the use of tartar emetic, and the only fact which justifies the use of veratrum viride in preference, is that the prostration resulting from its excessive action is of much briefer duration than that which follows the operation of the antimonial.

Aconite in the form of the tincture of the root is sometimes employed, in the dose of one or two drops every two hours, with a view to its effect upon the pulse. It has, however, been most popular for this purpose among certain irregular practitioners, who employ it largely in febrile affections generally. It is uncertain in its operation, and its free use is never devoid of danger. It cannot therefore be regarded as entitled to general use.

Digitalis is far superior to either of these remedies

in the great majority of cases. It may be employed in the form of tincture or infusion. The tincture may be given in the dose of from five to ten drops every two hours, diminishing or increasing the dose in accordance with the effect produced upon the pulse, which should be kept as near eighty beats per minute as possible. In prescribing this tincture, the strength of the preparation, as determined by previous use, should be borne in mind, as different samples vary considerably in energy. Where the particular specimen employed is used for the first time, small doses should be given, and gradually increased in accordance with the effect produced. The infusion is less variable in its effects, and is on this account a preferable preparation. It is made by macerating a drachm of the dried leaves in half a pint of boiling water for two hours, after which it may be strained, and tincture of cinnamon or any other aromatic added to improve the taste. The dose is a dessertspoonful every two hours.

In the prolonged use of digitalis its effects on the pulse should be carefully observed, and the well-known cumulative effect of the remedy should be borne in mind. The dose should be diminished to one-half so soon as the pulse is reduced to the proper standard, and only increased if the pulse begins again to increase in frequency. If the pulse is depressed below seventy, the remedy should be at once omitted, to be resumed subsequently, or altogether abandoned, in accordance with the subsequent symptoms.

If the patient is restless and sleepless at night, full doses of Dover's powder or of some preparation of opium may be given at bedtime.

During this early period of the complaint local remedies are not to be neglected. The free application of dry cups to the chest, at the point of greatest pain and tenderness, produces often great relief, and may be repeated if necessary. Emollient fomentations to the chest are also frequently of service.

Under the most favorable circumstances it will occasionally happen that the patient improves rapidly with this simple treatment, and is restored to health without passing into the stage of pulmonary consolidation. But in the majority of cases this happy result is not attained, and the symptoms indicate the gradual progress of the disorder.

The diaphoretic and sedative remedies of the early period are now to be gradually diminished, and so soon as any symptoms of an adynamic character make their appearance are to be abandoned altogether. The opiates at night, however, should be continued, and if the cough is troublesome, advantage will accrue from giving small doses of Dover's powder at regular intervals through the day. Two and a half grains of Dover's powder, every two or three hours, answers an excellent purpose at this stage. A Dover's powder prepared by substituting the nitrate of potash for the sulphate contained in the officinal article is preferable for this purpose.

A supporting treatment now becomes necessary; wine may be unhesitatingly resorted to, and as the disease advances, the spirituous liquors may be advantageously substituted.

Alcoholic stimulants are among the most important of the therapeutic measures to be employed in those cases of pneumonia which have gone on to consolida-

tion of the lung; and as considerable looseness of opinion exists as to the purposes for which they are given, and the proper mode of use, even indeed as to whether they should be used at all, a few remarks on these subjects appear appropriate.

The lung having once passed into the stage of consolidation, may either gradually undergo resolution and be restored to its normal condition, or it may become softer and more disorganized, passing finally into a state of diffuse suppuration, or even occasionally of gangrene with a fatal result.

Resolution is effected by the gradual casting off with the sputa of the elementary forms which stuff the minute bronchial tubes and air vesicles, and the reproduction of the normal epithelium. This process requires for its accomplishment a certain degree of vital energy and constitutional force, and where these are exhausted by the previous progress of the disorder, stimulants and nutrients are imperatively demanded to sustain the sinking energies of the economy in the condition in which these favorable changes are possible. They are as necessary here as in those surgical cases where a slough is to come away and cicatrization to be accomplished, and to omit them is as irrational and injurious in the one case as in the other.

The fatal process to be dreaded, the transformation of the consolidated lung into gray hepatization or diffuse suppurative alteration, is not a process of increased vitality, whatever may be thought of the processes of the earlier stages of the disease. On the contrary, it is essentially a degenerative change, accompanied by the fatty transformation, and must be accelerated

rather than diminished by depressing remedies of every kind, just as in a great granulating surface the healing process is accelerated by tonics, nutrients, and, if the extent of mischief is great, by stimulants, while mercurials and other depressing agents increase the suppuration and impede the healing process.

Such is very briefly the theory of the use of alcoholic stimulants in the stage of consolidation. It will be at once perceived that no direct curative influence is claimed for them; no good can result from their reckless and indiscriminate use; they are merely supporting remedies. If they moderate and even shorten the disease, it is simply by aiding in sustaining the vital energies at the point at which the natural restorative processes are possible. They are resorted to in pneumonia with very much the same objects that lead to their modern employment in typhoid fever, or in gunshot wounds.

The use of stimulants thus theoretically indicated is found in practice to give the most satisfactory results, and their judicious employment produces a marked diminution in the mortality of the disease.

To obtain these favorable results, stimulants should be promptly but moderately employed, combined with nutrients, the moment the powers of the economy begin to flag; feebleness of pulse, prostration, adynamic symptoms of any kind call at once for their use. They are not, however, at any time to be given to the extent of increasing the intensity of the febrile reaction or the heat and dryness of skin. As the disease progresses, the degree of stimulation should be gradually increased in very much the same general way as in typhoid or typho-malarial fever, and when

the patient begins to convalesce, they are to be gradually reduced in quantity until with returning health they are altogether discontinued.

Certain special remedies appear useful during the stage of consolidation in arresting the progress of the disorder and favoring resolution. One of these is chlorate of potassa, which is recently attracting considerable attention in the treatment of various adynamic affections. Given in the dose of ten or fifteen grains every two, three, or four hours, it frequently appears to exercise a most beneficial influence. The theory that it acts by yielding oxygen to the blood is, however, probably erroneous; at any rate, it rests at present on data too incomplete to withstand criticism.

Iodide of potassium is another remedy which has been much lauded; it may be given in half the dose of the chlorate of potassa, to which perhaps it is, on the whole, superior. Neither of these remedies is necessary in the majority of cases, but where the disease progresses in spite of the remedies previously indicated, one or the other may generally be employed with benefit.

Tonics may be advantageously combined with the stimulating and supporting measures in the later stages of the disorder. Of these sulphate of quinia is probably the most satisfactory in its results; it is especially indicated in cases in which there is profuse perspiration, and in the pneumonia of miasmatic regions. Some have gone so far as to affirm that in large doses it exercises a curative influence over the disease, and resort to it in the early stages for this purpose. This would, however appear to be an overestimate of the value of the remedy.

After the expectoration has become purulent, benefit occasionally results from the use of stimulating expectorants. Senega especially enjoys a reputation in this connection; it may be used in the form of infusion or syrup, a fluid ounce of the former or a fluid drachm of the latter being administered every two, four, or six hours, according to the urgency of the case.

During the convalescence, the bitter tonics and chalybeates may be advantageously employed.

The local treatment of pneumonia affords valuable assistance to the general remedies. During the earlier stages dry cups may be employed with benefit. From six to twelve cups may be applied over the seat of pain, and the operation may be repeated, from time to time, if the symptoms do not abate. Warm fomentations and emollient cataplasms are also useful during the same period. During the later stages the application of moderate sized blisters to the chest affords a valuable method of counter-irritation. The blister should never be left on more than four hours, and should afterward be encouraged to draw by the application of a poultice of bread and milk. This precaution is important, especially in low adynamic conditions, in which there is a tendency to the production of ulcers or even of superficial mortification if the blister is too long applied.

The diet throughout the disease should be supporting and nutritious. During the first few days of acute cases, it is true, a very light diet is sufficient. Toast-water, barley-water, toast and tea, and similar articles are all that is required; but when consolidation of the lung has taken place, a more supporting

diet becomes necessary. Animal broths are now indicated; chicken-water, mutton tea, or weak beef tea may be employed, in connection with which, if there is an indication for stimulants, wine-whey may be given. As symptoms of debility and prostration set in, a still more nutritious diet is required. Strong beef tea or beef essence, even broiled beef-steak or mutton-chop may be used, and milk-punch may be administered simultaneously.

The effect of the diet employed is to be carefully watched, and any symptoms of indigestion or gastric oppression after taking food are to be regarded as indicating the necessity of some change in its quantity or quality. In cases in which the symptoms or history of the case lead to the suspicion of an underlying scorbutic taint, lemonade and other subacid drinks should be freely given, and fresh fruits and well-cooked fresh vegetables should be furnished at an early period of the case, in such quantities as the stomach may be able to manage.

The general principles which should guide the management of the diet are, in short, the same as those laid down in connection with the diet of typho-malarial fever, and need not therefore be repeated in this place.

CHAPTER X.

PSEUDO-RHEUMATIC AFFECTIONS.

Under the head of acute rheumatism, chronic rheumatism, and lumbago, a vast number of cases have been reported to the Surgeon-General's office during the present war, and thousands of these cases have been discharged the service: 26,257 cases of acute rheumatism, 14,216 of chronic rheumatism, and 4289 of lumbago were reported prior to July 1st, 1862. There can be no doubt that very many of these cases were properly rheumatic, and were correctly classified in the reports. Extensive observation of this class of cases in hospitals and in the field has, however, satisfied the author that a very great number, and probably the larger number of them, are not rheumatism, nor in any way allied to that affection except by the presence of a single symptom—pain.

In the present chapter it is not proposed to discuss genuine rheumatism, for an account of the symptoms and treatment of which the reader is referred to the ordinary treatises on practice of medicine. The remarks offered will be limited to an attempt to describe and explain some of the chief of the protean conditions usually reported to the Surgeon-General's office under the above heads, and to which the designation pseudo-rheumatic affections or pseudo-rheu-

matism will be given, as indicating at once the superficial resemblance and real difference between these cases and genuine rheumatic disease.

The most characteristic group of the cases belonging under the head of pseudo-rheumatism contains most of the "*sore backs*" and "*weak backs*" which have been so common among the troops since the breaking out of the war.

The disease begins with malaise, languor, and general indisposition to exertion. By-and-by vague pains make their appearance in various portions of the body. These pains are sometimes acute and cutting, sometimes dull and heavy, but very often do not at first amount to more than a sense of soreness in the parts affected.

They may be located in any part of the body, but their most common seat is in the thighs and legs, and in the small of the back. The last is especially the characteristic seat of the disorder, and is more uniformly involved than any other portion of the body.

The pain and soreness is at first slight, so that although the patient may occasionally come to the surgeon for treatment, he continues to do military duty. Very often indeed he does not apply for treatment at all in this early stage, and when he first comes to sick-call inquiry shows that he has suffered from more or less pain for several weeks, or even longer.

As the disease progresses, the pain becomes more severe, and, if it is seated in the back or the lower extremities, the patient becomes quite unfit for duty. Sometimes he is confined to his bed, but most frequently he hobbles about with the help of a stick.

Occasionally he retains a perfectly healthy appearance, a normal appetite, and all the functions are performed with regularity. It is to be feared that very many of such patients are malingerers, as will be indicated more fully hereafter. In the majority of cases, however, more or less well-marked symptoms of constitutional disturbance accompany the gradual development of pain.

A peculiar pallid, clay-like appearance of the countenance, a tendency toward emaciation, palpitation of the heart—especially after any exertion—the large, cool, smooth, pale tongue already several times alluded to, and more or less diarrhœa, occurring sometimes from time to time, sometimes persistently, are among the most constant symptoms. Occasionally the gums are more or less spongy, or are hardened and bluish, sometimes they bleed when pressed by the finger; in some cases also more or less induration of the subcutaneous tissue occurs, especially in the neighborhood of the knee-joint, the indurated portion being somewhat discolored, of a yellowish or bluish hue, like that of an old bruise; still more rarely purpura-like blotches of small size may be encountered, especially on the lower extremities; but all these advanced phenomena of the scorbutic condition have been comparatively rare among our troops.

The form of pseudo-rheumatism now under consideration is most common among troops who have been ill supplied with fresh vegetables, and is more or less common in accordance with the degree to which they have been exposed to the conditions heretofore laid down as the ordinary causes of a scorbutic diathesis.

An examination of the joints fails to detect any of the stiffness, enlargement, or deformity so common in chronic rheumatism. The only exception are the comparatively rare cases in which the scorbutic state is sufficiently advanced to give rise to those peculiar bruise-like indurations above mentioned as occasionally present. This condition is, however, so characteristic that it is readily recognized; the peculiar diffuse induration, which pits slightly on pressure, but not so much as in œdema, and the yellowish, bluish, and livid discoloration make the diagnosis easy.

There can be no doubt that the cases now under consideration are to be interpreted simply as examples of incipient scurvy. From the neuralgic character of the pain, which is so prominent a symptom, they might in fact be designated as scorbutic neuralgia. Originating under precisely the same circumstances as other forms of scorbutic disease, they will be found to disappear under the use of a liberal antiscorbutic regimen. This view, if correct, is of the highest importance, as it indicates at once a mode of treatment by which thousands of men, too often discharged the service as incurable, may be saved to the army.

It gives the author great pleasure to state that since writing the preceding paragraph his attention has been drawn to a sanitary letter, written September 6th, 1862, by Surgeon Basil Norris, U. S. A., in which views are expressed essentially similar to the foregoing. In this letter, which refers to the health of the troops at Fort Craig, New Mexico, Surgeon Norris says: "The character of the pain in incipient scurvy is so like that in rheumatism, as I have seen it in this territory, that I am inclined to the opinion

that a fair proportion of all the cases of rheumatism occurring in this department may be successfully treated by fresh vegetables, fruits, lime-juice, and other remedies found best adapted to the case of scurvy."

In another class of cases which is perhaps equally common, the constitutional symptoms are entirely different. The complexion is more or less icteroid in hue, and a peculiar anæmic pallor, conjoined with the evidences of hepatic disorder, permits at once the recognition of the condition described in a previous chapter as chronic malarial poisoning. More or less disorder of the bowels, in the shape of constipation or of slight diarrhœa, is usually present. Tenderness and increased dullness of percussion in the region of the spleen indicate enlargement of that organ. Occasional attacks of intermittent fever are common. In this class of patients the pain does not usually precede the development of the constitutional symptoms; on the contrary, the latter often last for a considerable period of time before the neuralgic phenomena make their appearance. Not unfrequently the pains are decidedly intermittent, pursuing either a quotidian or a tertian type.

This class of cases is most common among troops exposed to decided malarial influences, who have, however, escaped the causes of scurvy, or who have not been exposed to them for a sufficient time to develop the symptoms of scorbutic disease.

In still a third class of cases, which up to the present time has been much more numerous than either of the preceding conditions, the two groups of symptoms above described are variably commingled. The

troops operating in a malarial region, and exposed more or less to the influences which develop the scorbutic tendency, suffer from pathological conditions resulting from both these sets of causes; with the icteroid hue, enlarged spleen, and anæmia of chronic malarial conditions, the smooth, large tongue, irritable heart, clay-like countenance, and loose bowels of the scorbutic state are conjoined. This condition of the system has been described in Chapter IV. Section III., and it is therefore unnecessary here to enter more fully into particulars.

A certain number of these cases escape without the rheumatic pains under consideration, but a large number are affected by them.

It appears probable that the great majority of the chronic cases of rheumatic pains occurring in the army belong to one or another of the three categories sketched above.

But there are other cases frequently reported as rheumatism which are more trifling in their nature, and generally last but a short time. The patient, after some exposure, such as picket duty in the rain, or sleeping in wet clothes or on the damp ground, experiences a slight chilliness, sometimes amounting to a rigor, and followed by feverishness, furred tongue, and some dryness of the skin. Accompanying these symptoms is some soreness and stiffness of the muscles of the trunk and limbs, sometimes amounting to actual pain. This condition lasts two or three days, and then usually subsides, even when no treatment has been employed. These cases, spoken of familiarly as colds in the limbs, constitute a very

simple affection, and are not allied to true rheumatism. They probably consist essentially in a state of congestion and irritation in the muscles affected, resulting from the effects of the exposure.

The several diverse states thus briefly sketched constitute the great bulk of the cases of disease reported under the head of rheumatism. There remains to be considered a very large group of cases often reported in the same class, in which the most scientific examination fails to detect any disease whatever. The patients complain as loudly of pain in the back and limbs as in the most decided cases of genuine rheumatism, or of malarial and scorbutic neuralgia. They stoop in their gait, and limp about by aid of sticks, but they appear well nourished, have a good appetite, devour their full ration of food, and present none of the grave constitutional symptoms described in connection with the cachectic neuralgias we have considered. Nor are any of the symptoms of chronic rheumatism present. There is no deformity, swelling, stiffness, or immobility of the joints. Occasionally the patient pretends stiffness of a joint, sometimes of the elbow, more frequently of the knee. An attempt to execute passive motion meets with a resistance which sometimes cleverly imitates the immobility of a rheumatic joint; but if he be put under the influence of an anæsthetic, all rigidity disappears, and the limb can be moved freely in every direction. These patients are more apt to attribute their malady to a strain than the genuine cases, and tell frequently a pitiful story. The experienced surgeon will very often detect them by this story alone; they whimper, and even sob in an unmanly manner,

which in itself alone should produce suspicion. This suspicion is confirmed by finding, on careful examination, that all the constitutional symptoms of rheumatism, scorbutic and malarial disease, are absent.

Considerable difference of opinion has existed in recent times on the subject of malingering, and there are not wanting those who dispute its frequency. An acute observer and eloquent writer, Miss Florence Nightingale, denies its existence, except in very rare cases, among the British troops in the Crimea, and seems to regard the instances quoted as such by some of the medical officers, as evidence rather of the ignorance of the surgeon than of the delinquency of the soldier. Without in any way wishing to controvert the opinion of this illustrious lady, so far as the British army in the Crimea is concerned, it is impossible for any careful observer who has been familiar with the military hospitals of the United States armies during the first two years of the war, to deny that malingering of every kind has been exceedingly common. The whole military system of the country during this period favored and encouraged it. How often have patients been discharged the service for disability from disease, who, in less than six weeks, have enlisted in other State organizations; the inducement being the enormous bounties which a mistaken patriotism offered for recruits, and the security from detection afforded by the vast size of the country and of the army! Add to this the general looseness of discipline—an inevitable attendant of a suddenly created and great military establishment, especially in a republican country, where the private soldier is, from

the very nature of things, the first care of the people—and the inexperience in the care of soldiers of the newly appointed surgeons during the early portion of the war, and the frequency of malingering, in all its forms, will cease to create surprise. With the progress of the army in organization and discipline, and with the developing experience of the military surgeons, these cases are becoming daily less frequent; and the improvement in this respect is at once apparent to the most superficial observer of the military hospitals.

Rheumatic affections are perhaps most frequently counterfeited by malingerers, and this on account of the supposed difficulty of detection. If a man positively affirms that he suffers great pain in some portion of the body, it seems to the popular mind absurd for a surgeon to affirm that he does not, and this idea has been acted upon till forbearance is exhausted; and it has become necessary to take this class of cases into consideration in making regulations as to the physical conditions which shall exempt from the draft.

Paragraph 85 of the "Regulations for the Government of the Bureau of the Provost Marshal General," issued April 21, 1863, provides that "Chronic rheumatism, unless manifested by positive change of structure, wasting of the affected limb, or puffiness or distortion of the joints, does not exempt. Impaired motion of joints and contraction of the limbs, alleged to arise from rheumatism, and in which the nutrition of the limb is not manifestly impaired, are to be proved by examination while in a state of anæsthesia induced by ether only.

"Pain, whether simulating headache, neuralgia in

any of its forms, rheumatism, lumbago, or affections of the muscles, bones, or joints, is a symptom of disease so easily pretended that it is not to be admitted as a cause for exemption, unless accompanied with manifest derangement of the general health, wasting of a limb, or other positive sign of disqualifying local disease."

These excellent and well-considered regulations are worthy of the most attentive consideration of military surgeons. The existence of such regulations shows the frequency of the forms of feigned disease at which they are aimed. They also provide a summary way of disposing of such cases, and it will be at once understood that the surgeon is no longer justified in relieving a soldier from duty, still less in sending him to general hospital or discharging him the service, for a condition which has been decided not to exempt from military duty.

Treatment.—The treatment of cases of pseudo-rheumatism will of course vary in accordance with the constitutional symptoms present. The first duty of the surgeon in every case is to make a critical examination of the urine. It will be found, in a considerable number of cases, that the lumbar pains are based upon profound structural alterations of the kidney, as evidenced by the presence of albumen in the urine, and of the various forms of tubular casts. In other cases functional disorders of the urinary secretion will be found to account for the lumbar difficulty. Abundant crystals of oxalate of lime, or of uric acid, are sometimes found; occasionally sugar is present. Of course such cases require each the special treatment indicated by the condition which may exist, and

are to be carefully discriminated from the malarial and scorbutic forms of pseudo-rheumatism discussed in this chapter.

In the *scorbutic class of cases* the general treatment of scorbutic affections is imperatively demanded. In well-marked instances, where it is not possible to furnish fresh vegetables in sufficient quantity and variety, it is desirable to give the patient a furlough. It has been found that a few weeks at home, with the varied diet and pleasurable excitement thus secured, has a more potent effect in producing a rapid cure than the most energetic remedies. Blisters, plasters, and rubefacient applications may be rejected as altogether useless. The occasional application of dry cups is, however, advantageous. In addition to a liberal diet and such fresh vegetables as can be obtained, the administration of alkalies and chalybeates will be found productive of benefit. The carbonate of potash, liquor potassa, cream of tartar, and acetate of potassa will be found among the most efficient of the alkaline remedies, and tincture of the chloride of iron is perhaps as efficient as any of the chalybeates.

In *simple malarial cases* quinine, alone or combined with chalybeates, and arsenical preparations, especially Fowler's solution, are among the most reliable remedies. Whichever is selected should be given cautiously and persistently for a considerable period, in order to produce full benefit.

In *mixed cases*, in which both malarial and scorbutic symptoms are present, a combination of the two plans of treatment above indicated must be resorted to.

Extract of nux vomica is a valuable tonic in all these cases; it may be given in the dose of half a grain

three times a day, suspending its use from time to time if muscular twitchings make their appearance.

In the simple cases of muscular soreness, and pains resulting from exposure to cold, little treatment is required; a rubefacient liniment is, at most, all that is necessary. The ammonia liniment, composed of liquor ammoniæ and olive oil, used alone or combined with a little oil of turpentine, soap liniment, alone or combined with laudanum or tincture of cantharides, will be found well adapted to this class of cases.

APPENDIX.

APPENDIX.

As an appendix to the foregoing essay, it has been deemed advisable to present the statistical form of "Report of Sick and Wounded" at present employed in the United States Army, with a few brief explanatory remarks.

REPORT OF SICK AND WOUNDED.

*Station:*_____. *Month:*_____, 186 .

TAKEN ON SICK REPORT DURING THE MONTH.

(*Cases remaining from last month are not to be entered, except in the Summary.*)

Classes of Diseases.	Orders of Diseases.	Tabular List of Diseases.	Cases from other Hospitals.	All other Cases.	All Deaths.
CLASS I.—Zymotici. (Zymotic Diseases.)	Order 1.—Miasmatic Diseases.	Typhoid fever			
		Typhus fever			
		Typho-malarial fever			
		Yellow fever			
		Remittent fever			
		Intermittent fever. { Quotidian / Tertian / Quartan / Congestive			
		Diarrhœa { Acute / Chronic			
		Dysentery { Acute / Chronic			
		Epidemic cholera			
		Erysipelas			
		Hospital gangrene			
		Pyæmia			
		Smallpox			
		Varioloid			
		Measles			
		Scarlet fever			
		Diphtheria			
		Mumps			
		Epidemic catarrh			
		Other diseases of this order			
		Carry forward			

REPORT OF SICK AND WOUNDED—*Continued.*

TAKEN ON SICK REPORT DURING THE MONTH.

(*Cases remaining from last month are not to be entered, except in the Summary.*)

Classes of Diseases.	Orders of Diseases.	Tabular List of Diseases.	Cases from other Hospitals.	All other Cases.	All Deaths.
		Brought forward			
CLASS I.—Zymotici—*Continued.*	Order 2.—Enthetic Diseases.	Syphilis.....			
		Gonorrhœa			
		Orchitis (gonorrhœal).....			
		Stricture of urethra.....			
		Purulent ophthalmia.....			
		Hydrophobia.....			
		Glanders			
		Bite of serpents.....			
		Other diseases of this order.....			
	Order 3.—Dietic Diseases.	Starvation.....			
		Scurvy			
		Purpura.....			
		Delirium tremens.....			
		Inebriation			
		Chronic alcoholism.....			
		Other diseases of this order...			
CLASS II.—Cachectici. (Constitutional Diseases.)	Order 1.—Diathetic Diseases.	Gout.....			
		Rheumatism..... { Acute. ..... Chronic.....			
		Anæmia.....			
		Idiopathic dropsy.....			
		Cancer ..... { Hard ..... Soft			
		Melanosis			
		Epithelial cancer			
		Tumors.....			
		Dry gangrene.....			
		Other diseases of this order.....			
	Order 2.—Tubercular Diseases.	Consumption.....			
		Scrofula.....			
		Other diseases of this order.....			
		Carry forward.....			

REPORT OF SICK AND WOUNDED—*Continued.*

TAKEN ON SICK REPORT DURING THE MONTH.

(*Cases remaining from last month are not to be entered, except in the Summary.*)

Classes of Diseases.	Orders of Diseases.	Tabular List of Diseases.	Cases from other Hospitals.	All other Cases.	All Deaths.
		Brought forward			
CLASS III.—Parasitici. (Parasitic Diseases.)		Itch.....			
		Tape worm			
		Other intestinal worms			
		Other diseases of this order.....			
CLASS IV.—Monorganici. (Local Diseases.)	Order 1.—Diseases of the Nervous System.	Apoplexy (cerebral)			
		Epilepsy.....			
		Headache.....			
		Insanity			
		Inflammation of the brain.....			
		Do. of the membranes of the brain			
		Do. of the spinal cord.....			
		Nostalgia.....			
		Neuralgia.....			
		Paralysis.....			
		Sunstroke.....			
		Tetanus.....			
		Other diseases of the nervous system..			
	Order 2.—Diseases of the Eye.	Amaurosis.....			
		Cataract.....			
		Inflammation of the conjunctiva ..			
		Inflammation of the iris.....			
		Inflammation of the retina.....			
		Night blindness			
		Other diseases of the eye.....			
	Order 3.—Diseases of the Ear.	Earache.....			
		Inflammation of the internal ear..			
		Nervous deafness			
		Otorrhœa.....			
		Other diseases of the ear			
		Carry forward.....			

REPORT OF SICK AND WOUNDED—*Continued.*

TAKEN ON SICK REPORT DURING THE MONTH.

(*Cases remaining from last month are not to be entered, except in the Summary.*)

Classes of Diseases.	Orders of Diseases.	Tabular List of Diseases.	Cases from other Hospitals.	All other Cases.	All Deaths.
		Brought forward.....			
CLASS IV.—Monorganici—*Continued.*	Order 4.—Diseases of the Organs of Circulation.	Aneurism.....			
		Chronic valvular disease of the heart.....			
		Dropsy from heart disease.....			
		Dropsy of pericardium.....			
		Inflammation of pericardium.....			
		Inflammation of endocardium.....			
		Inflammation of the veins.....			
		Varicose veins.....			
		Varicocele.....			
		Other diseases of this order.....			
	Order 5.—Diseases of the Respiratory Organs.	Asthma.....			
		Bronchitis..... { Acute..... Chronic.....			
		Dropsy of chest.....			
		Epistaxis.....			
		Inflammation of larynx.....			
		Inflammation of lungs.....			
		Inflammation of pleura.....			
		Hemorrhage from lungs.....			
		Other diseases of this order.....			
	Order 6.—Diseases of the Digestive Organs.	Colic.....			
		Constipation.....			
		Cholera morbus.....			
		Cirrhosis of liver.....			
		Dropsy from hepatic disease.....			
		Dyspepsia.....			
		Diseases of pancreas.....			
		Diseases of spleen.....			
		Fistula in ano.....			
		Hernia..... { Femoral..... Inguinal.....			
		Hemorrhage from stomach.....			
		Hemorrhage from bowels.....			
		Inflammation of the tonsils.....			
		Inflammation of the stomach.....			
		Inflammation of the bowels.....			
		Inflammation of the peritoneum...			
		Inflammation of the liver { Acute.. Chronic			
		Jaundice.....			
		Piles.....			
		Other diseases of this order.....			
		Carry forward.....			

REPORT OF SICK AND WOUNDED—*Continued.*

TAKEN ON SICK REPORT DURING THE MONTH.

(*Cases remaining from last month are not to be entered, except in the Summary.*)

Classes of Diseases.	Orders of Diseases.	Tabular List of Diseases.	Cases from other Hospitals.	All other Cases.	All Deaths.
CLASS IV.—Monorganici—*Continued.*		Brought forward.....			
	Order 7.—Diseases of Urinary and Genital Organs.	Calculus.....			
		Diabetes.....			
		Dropsy from renal disease.....			
		Diseases of the prostate.....			
		Diseases of the testis.....			
		Gravel			
		Inflammation of the kidneys.....			
		Inflammation of the bladder.....			
		Incontinence of urine.....			
		Hydrocele.....			
		Other diseases of this order.....			
	Order 8.—Diseases of the Bones and Joints.	Anchylosis.....			
		Caries.....			
		Inflammation of joints.....			
		Inflammation of bones			
		Inflammation of periosteum.....			
		Necrosis.....			
		Other diseases of this order.....			
	Order 9.—Diseases of the Integumentary System.	Abscess			
		Boil.....			
		Carbuncle			
		Ulcers.....			
		Whitlow.....			
		Skin diseases.....			
		Carry forward.....			

REPORT OF SICK AND WOUNDED—*Continued.*

TAKEN ON SICK REPORT DURING THE MONTH.

(*Cases remaining from last month are not to be entered, except in the Summary.*)

Classes of Diseases.	Orders of Diseases.	Tabular List of Diseases.	Cases from other Hospitals.	All other Cases.	All Deaths.
CLASS V.—Thanatici. (Violent Diseases and Deaths.)		Brought forward.....			
	Order 1.—Wounds, Injuries, and Accidents.	Burns.....			
		Contusions.....			
		Concussion of the brain.....			
		Drowning.....			
		Dislocations.....			
		Fractures..... { Simple..... Compound.....			
		Gunshot wounds (see tabular statement of).....			
		Incised wounds.....			
		Lacerated wounds.....			
		Punctured wounds.....			
		Poison.....			
		Suffocation.....			
		Sprains.....			
		Scalds.....			
		Other accidents and injuries.....			
	Order 2.—Homicide.	*Homicide*.....			
	Order 3.—Suicide.	Wounds.....			
		Poison.....			
		Drowning.....			
		Hanging.....			
		Otherwise.....			
	Order 4.—Execution of Sentence.	Hanging.....			
		Shooting.....			
		Total.....			

Note.—The nomenclature of this form will be strictly observed. Whenever cases are reported under headings specified in italics, an explanation of details will be made in the Remarks; thus, if a certain number of simple fractures are specified, the remarks will set forth how many were of the humerus, how many of the femur, etc. If a certain number of skin diseases are reported, the remarks will set forth how many were eczema, how many impetigo, etc. etc. All violent and sudden deaths to be entered under the appropriate heads whether the individual has or has not been on the Sick Report.

GENERAL SUMMARY.

Remaining last report.			Taken Sick or Wounded during the Month.			Returned from furlough or desertion, etc.	Aggregate.	During the Month.						Remaining.		
Sick.	Wounded, etc. (Class V.)	Total.	Taken sick.	Wounded, etc. (Class V.)	Total.			Returned to duty.	Sent to general hospital.	Furloughed.	Discharged.	Deserted.	Died.	Sick.	Wounded, etc. (Class V.)	Total.

Mean Strength of the Command.			Taken Sick or Wounded during the Month.								Average number on Sick Report daily.*		
			Commissioned Officers.				Enlisted Men.						
			Sick.		Wounded		Sick.		Wounded				
Officers.	Enlisted men.	Total.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	In hospital.	In quarters.	Total.

Note.—* This average is to be obtained from the Morning Reports by adding together the numbers reported as "Remaining" in Hospital and in Quarters daily, and dividing each Total by the number of days in the month.

TABULAR STATEMENT

SEAT AND CHARACTER.			Side of Body		How received.		Nature of Missile.				
			Right.	Left.	In battle.	By accident or otherwise.	Round leaden bullet.	Conical leaden bullet.	Shell.	Round shot.	Burns by powder, explosions, etc.
GUNSHOT WOUNDS.	Flesh wounds.	Of head									
		Of neck									
		Of thoracic parietes									
		Of abdominal parietes									
		Of back									
		Of external genitals									
		Of upper extremities									
		Of lower extremities									
	Wounds of cavities.	Of brain									
		Of lungs									
		Of heart									
		Other wounds of thoracic cavity									
		Of stomach									
		Of intestines									
		Of bladder									
		Other wounds of abdominal cavity									
	Gunshot fractures.	Of cranium									
		Of lower jaw									
		Of facial bones									
		Of clavicle									
		Of scapula									
		Of humerus									
		Of forearm									
		Of femur — Lower third.									
		Of femur — Middle third									
		Of femur — Upper third.									
		Of leg									
		Of ribs									
		Of vertebræ									
		Of other bones									
	Wounds of joints.	Of shoulder joint									
		Of elbow									
		Of wrist									
		Of hip									
		Of knee									
		Of ankle									
		Of other joints									
	Contusions and injuries by spent balls										
	Total										

OF GUNSHOT WOUNDS.

Remaining from last report.	Total.	Treatment of all cases in Hospital.			Result of all cases in Hospital.						Remaining under treatment	REMARKS. (The occurrence of Secondary Hemorrhage, Tetanus, Pyæmia, and Hospital Gangrene, will be here noted.)
		Amputation.	Excision.	Simple dressing.	Returned to duty.	Sent to general hospital.	Furloughed.	Deserted.	Discharged.	Died.		

TABULAR STATEMENT OF OPERATIONS

LIST OF OPERATIONS.		Side of Body		For what performed.		Period of operation.		Before admission to hospital.	Remaining from last report.	Total.
		Right.	Left.	Gunshot wounds.	Other causes.	Primary operations.	Secondary operations.			
Amputations.	Fingers									
	Wrist									
	Forearm									
	Elbow									
	Arm									
	Shoulder									
	Toes									
	Tarso-metatarsal (Lisfranc's)									
	Medio-tarsal (Chopart's)									
	Ankle joint (Syme's)									
	Leg									
	Knee									
	Thigh.... Lower third									
	Thigh.... Middle third									
	Thigh.... Upper third									
	Hip									
	Other amputations									
	Double amputations									
Excisions.	Wrist									
	Elbow									
	Shoulder									
	Jaw (lower)									
	Ankle									
	Knee									
	Hip									
	Continuity of long bones									
	Other excisions									
Extractions of balls and other foreign bodies										
Trephining										
Ligature of arteries.	Of									
	Of									
	Of									
	Of									
	Of									
Other operations										
Total										

PERFORMED, AND THEIR RESULTS.

Results of all cases in Hospital.								Remaining under treatment.....	REMARKS. (The occurrence of Secondary Hemorrhage, Tetanus, Pyæmia, and Hospital Gangrene, will be here noted.)
Returned to duty.	Sent to general hospital.	Furloughed.	Deserted.	Discharged.	Died.		Second operation necessary.		
					After primary operation.	After secondary operation.			

TABULAR STATEMENT OF INCISED AND PUNCTURED WOUNDS.

SEAT AND CHARACTER.	SIDE OF BODY		HOW RECEIVED.		NATURE OF WOUND.		NATURE OF WEAPON.			Remaining from last report.	TOTAL.	TREATMENT OF ALL CASES IN HOSPITAL.			RESULTS OF ALL CASES IN HOSPITAL.						Remaining under treatment.....	REMARKS. (Secondary Hemorrhage, Tetanus, Pyæmia, and Hospital Gangrene, to be here noted.)
	Right.	Left.	In battle.	Otherwise.	Incised.	Punctured.	Sword.	Bayonet.	Other weapon.			Amputation.	Excision.	Simple dressing.	Returned to duty.	Sent to general hospital.	Furloughed.	Deserted.	Discharged.	Died.		
TOTAL.....																						

DISCHARGES ON SURGEON'S CERTIFICATE, AND DEATHS.

Number.	Name.		Rank.	Regiment.	Company.	Disease or Wound. (If wound, state locality.)	Date of discharge from service.	Degree of disability.	Date of death.
	Surname.	Christian name.							

Note.—Enter discharges first, and separate them from the list of deaths by a line ruled across the page. Discharges on Surgeon's Certificate and Deaths occurring among those of the command not on Sick Report, will also be reported, but separated from the others by a *double* line drawn across the page. Specify the manner in which the disease originated, when it is known. When a *probable* case for pension, state the degree of disability, as one-third, one-half, two-thirds, or total.

REMARKS.

Directions.—Here specify the details with regard to entries made opposite headings specified in italics, as required by the note on page 336. Besides which, the following information will be given either on this blank or in an accompanying letter of transmittal: An account of any surgical operations not included in the tabular statement; any details as to fractures, gunshot wounds, amputations, and exsections not given in the foregoing table. Also brief information on each of the following heads, when applicable: Fevers—Their character and symptoms, an outline of the plans of treatment found most efficient, with remarks on the location and sanitary condition of camps or quarters, during the prevalence of these disorders; Diarrhœa and Dysentery—Grade and treatment, with remarks on the character of the ration, and the modes of cooking; Scorbutic diseases—Character and symptoms, with observations on causation, and a statement of the means employed to procure exemption; Respiratory diseases—Symptoms, severity, and treatment, with remarks on the sheltering of the troops, and the atmospheric conditions. Similar remarks on other preventable diseases. *Important* cases of every kind should be reported in full. Where post-mortem examinations have been made, accounts of the pathological results should be carefully prepared. See Circular No. 2, Surgeon-General's Office, May 21, 1862.

(*Endorsement.*)

REPORT

OF

SICK AND WOUNDED.

Station: .....

Month: .....

FORWARDED BY

.....

Surgeon.

COMMAND.

REGIMENTS.	COMPANIES.

[Here specify the name of the regiment or company, with the name of the brigade, division, corps, or army to which it belongs.]

Received, S. G. O. ....., 186 .

The classification adopted in this form is based upon that embodied in a report drawn up by William Farr, Esq., M.D., of London, for the consideration of the "International Statistical Congress," which met in Paris, September, 1855, and which is essentially that authorized by the Registrar-General of England, to be used in the preparation of the "Weekly Return of Births and Deaths in London," and that adopted in the medical regulations of the British army.

Certain modifications of detail have, however, been introduced on what were believed to be sufficient reasons. Of these the following are the most important: "Parasitic Diseases," classified by Farr as the fourth order of Zymotici, have been erected into a separate class, being regarded as a group of disorders sui generis, and certainly in no respect allied to the other affections of the zymotic group. Dr. Farr's class of "Developmental Diseases" (metamorphici) has been omitted, these complaints belonging rather to women, children, and the old, than to male adults. Finally, Diseases of the Eye and of the Ear, included by Dr. Farr in a single order with Diseases of the Nervous System, have been erected into separate orders of the class "Monorganici," "Local Diseases."

The following brief definitions of the terms employed in this classification may be presented:—

Class I. ZYMOTICI (*ζύμη*, leaven), ZYMOTIC DISEASES.

"Diseases that are either epidemic, endemic, or contagious, induced by some specific body, or by the want or by the bad quality of food."

ORDER 1. *Miasmatici* (*μίασμα*, stain, defilement), *Miasmatic Diseases.*

Diseases due to unhealthy atmospheric conditions of various kinds. Under this head are included affections arising from the various atmospheric contagions and epidemic influences, as well as those due to marsh miasmata. Many of the dis-

orders classified in this group are more or less influenced, modified, or even sometimes caused by dietic influences, and are thus allied to the order of Dietic Diseases; as an example, certain forms of diarrhœa and dysentery may be named.

Order 2. *Enthetici* (ἔνθετος, put in, implanted), *Enthetic Diseases.*

Diseases due to the inoculation of various morbid matters.

Order 3. *Dietici* (δίατα, way of life, diet), *Dietic Diseases.*

Diseases due to errors in food, drink, and mode of life.

Class II. Cachectici (καχεξία, bad habit of body), Constitutional Diseases.

Sporadic diseases, affecting several organs, in which new morbid materials are often developed, sometimes hereditary.

Order 1. *Diathetici* (διαθεσις, condition, diathesis), *Diathetic Diseases.*

Diseases resulting from various ill understood constitutional peculiarities or diatheses.

Order 2. *Tubercular Diseases.*

Diseases characterized by the production of tubercles in the several tissues and organs of the body.

Class III. Parasitici (παρασιτος, parasite), Parasitic Diseases.

Diseases due to the presence of parasites.

Class IV. Monorganici (μονος, alone; and ὄργανον, organ), Local Diseases.

Sporadic diseases, in which the functions of particular organs or systems are disturbed or obliterated, with or without inflammation.

Order 1. *Diseases of the Nervous System.*
Order 2. *Diseases of the Eye.*

ORDER 3. *Diseases of the Ear.*
ORDER 4. *Diseases of the Organs of Circulation.*
ORDER 5. *Diseases of the Respiratory Organs.*
ORDER 6. *Diseases of the Digestive Organs.*
ORDER 7. *Diseases of the Urinary and Generative Organs.*
ORDER 8. *Diseases of the Bones and Joints.*
ORDER 9. *Diseases of the Integumentary System.*

These designations explain themselves.

Class V. THANATICI (*θανατοι*, violent deaths), WOUNDS AND INJURIES.

Violent diseases or deaths.

ORDER 1. *Wounds, Injuries, and Accidents.*
ORDER 2. *Homicide.*
ORDER 3. *Suicide.*
ORDER 4. *Execution.*

No explanation of these terms is needed.

DIRECTIONS TO BE FOLLOWED IN MAKING OUT THIS REPORT.

Under the head of "*taken on the sick report during the month*" cases received during previous months and still under treatment are *not* to be included. This suggestion may appear unnecessary to many, but reports are constantly received at the Surgeon-General's office in which the sick remaining from the previous month are consolidated with the new cases. Of course if this error is committed, the annual summary prepared by consolidating the twelve monthly reports will represent a greater amount of sickness than really existed. *All deaths*, however, whether of patients remaining from previous months, or of patients received during the month, are to be entered on the face of the report, as well as in the list of deaths by name. To enter, as is sometimes done, only the deaths among those received during the month, would make

the annual total obtained, by consolidating twelve monthly reports, erroneously small.

Opposite the "*tabular list of diseases*" three columns are ruled in the report, one headed "*cases from other hospitals*," one headed "*all other cases*," and one headed "*deaths.*"

The column headed "*cases from other hospitals*" is intended for the entry of cases the treatment of which has been commenced elsewhere. This column has been rendered necessary by the frequent transfer of patients, in large numbers, from one hospital to another, which has been an inevitable feature of the hospital system during the war. The great hospitals in the rear of the large armies, becoming encumbered by the numbers of sick and wounded, are evacuated upon the hospitals at more remote points to make room for fresh cases. Patients already reported once in the first set of hospitals were again reported at those to which they were sent, and thus appeared as new cases. It sometimes happened that a single case of disease would pass through half a dozen hospitals, and be reported anew from each. To avoid this source of error, it is now directed that all cases received from *other hospitals* be entered in a separate column in the report. Of course in the reports from regiments in the field, it rarely happens that any cases occur to be reported in this column.

In the column headed "*all other cases*," all cases are to be entered except those received from other general hospitals. Here the regimental surgeon enters the sick of his regiment, and the hospital surgeon the sick received directly from the field. The deaths of both these classes of cases are to be entered in the column headed "*deaths.*"

The entries in these columns are to be made in the ordinary numerals, placing the appropriate numbers opposite the name of the disease on the tabular list to which they belong. Whenever cases are reported under the headings specified in italics, an explanation of details will be made in the *remarks* at the close of the report; thus if a certain number of *skin diseases* are reported, the *remarks* will set forth how many were eczema, how many impetigo, etc., etc. If cases are reported

under the head of "*other diseases of this order*," the *remarks* will specify what the diseases so included are.

The *General Summary* requires careful attention, and is more frequently made out erroneously than any portion of the report. The following directions should be closely followed to secure accuracy:—

The *total*, under the head "*taken sick or wounded during the month*," must agree with the total number of cases entered in the "*tabular list of diseases.*" This total, added to the total "*remaining last report*," and the number returned from furlough, desertion, etc., produces the "*aggregate*," and must of course equal it. The number entered as "*died*" must equal the total deaths in the tabular list and the list of deaths entered by name in the subsequent part of the report. The number entered as "*discharged*" must equal the number of names in the subsequent list of discharges.

The sum of the numbers entered under the six heads "*returned to duty*," "*sent to general hospital*," "*furloughed*," "*discharged*," "*deserted*," "*died*," added to the total "*remaining*," must equal the "*aggregate;*" if it does not, there is an error in the report.

The "*mean strength of the command*" is to be obtained as follows: The strength on the first, fifteenth, and last of the month, obtained from the adjutant, are to be added together and divided by three. This is to be done for officers and enlisted men separately, and the two results added together for the "*total.*" The nearest whole numbers are to be employed, and not fractions or decimals.

The next division of the Summary is intended to show the comparative amount of sickness among commissioned officers and enlisted men. Under this head only the number taken on sick report during the month is to be included, and not the "aggregate," as is sometimes erroneously done. If this error is committed it is impossible to obtain a correct annual summary by the addition of the monthly reports. The sum of the cases and deaths reported under these heads must equal the total taken sick or wounded during the month.

Lastly. The "*average number on sick report daily*" is to be obtained by the surgeon from his book of morning reports, by adding together in two separate columns the number remaining in *hospital* and in *quarters daily*, and dividing each total by the number of days in the month. This item, which is often neglected, is of the utmost importance for statistical purposes, as furnishing the amount of "*constant sickness.*"

In the tabular statement of wounds and operations, attention must be given to the following points, in order to secure accuracy.

DIRECTIONS TO BE OBSERVED IN THE PREPARATION OF THE CONSOLIDATED TABULAR STATEMENTS.

I.—*Tabular Statement of Gunshot Wounds.* 1. The sum of the columns "Right," "Left," under the caption "Side of body," should be equal to the sum of the columns under the caption "How received," and also equal, if possible, to the sum of the several columns under the caption "Nature of missile." In the entries under this latter caption, however, only those cases concerning which the surgeon is positive, should be recorded; uncertain cases should be omitted rather than entered on conjecture.

In these columns, cases occurring since the last report only are to be recorded.

2. The number of cases of each injury remaining under treatment from previous months being entered in the column "Remaining from last report," the sum of this last column and the two columns under "Side of body" gives the "Total" entered in the column so headed.

3. The sum of the several columns under the caption "Treatment of all cases in hospital" must agree with the "Total."

4. The sum of the several columns under the caption "Results of all cases in Hospital," and of the column "Remaining under treatment . . . . . ," should also agree with the "Total."

5. The columns under the caption "Results of all cases in Hospital," and the column "Remaining under treatment . . . . . ," should always be filled out opposite *each one of the several* injuries, and not merely presented *en masse* at the foot of the table. The whole value of the report depends upon accuracy in the above respects.

When the same patient is treated for more than one wound, the case is to be entered opposite the designation of the most serious injury, and the details given in the "Remarks."

II.—The same general directions apply to the "*Table of Incised and Punctured Wounds.*"

III.—With regard to the "*Tabular Statement of Operations Performed, and their Results,*" it may be observed that in the columns "Right," "Left," under the caption "Side of body," are to be entered only the operations performed in the hospital from which the report comes, and that the total of these two columns must agree with the total of the columns under the caption "For what performed," and with those under "Period of operation."

2. In the column "Before admission to Hospital" are to be entered all patients received who had been operated on prior to admission. These cases are not to be included in the preceding headings.

3. The column "Total" must be equal to the sum of the columns "Side of body," "Before admission to Hospital," and "Remaining from last report."

4. The sum of the several columns "Returned to duty," "Sent to General Hospital," "Furloughed," "Deserted," "Discharged," and "Died," added to "Remaining under treatment," must equal the column "Total." The entries in the column "Second operation necessary" do not enter into this computation.

5. It is especially desirable that the columns "After primary operations," "After secondary operations," under the caption "Died," in this report, should be carefully noted.

6. When a "Second operation" has been performed, its character should be stated in the "Remarks."

7. As in the table of Gunshot Wounds, the columns under "Results" and "Remaining under treatment" should always be filled out opposite each of the several injuries reported, and not as a total at the bottom of the table, as is sometimes erroneously done. These several points should be carefully observed by the surgeon before forwarding this report.

The name and locality of the hospital, and the signature and rank of the medical officer in charge, should always be appended to the report.

The above directions were drawn up at the suggestion of Surgeon J. H. Brinton, U. S. V., who has informed the author that negligence with regard to one or another of these necessary conditions is frequently observed in the reports received by him at the Surgeon-General's office. The directions have been issued officially in the form of a circular.

The list of *discharges on surgeon's certificate and deaths* should be carefully and conscientiously made out. The rights of individuals, especially in connection with pension claims, frequently depend on the evidence furnished to the Surgeon-General's office by this portion of the report.

The explanations contained in the "report" under the head of "Remarks," render this portion of the paper sufficiently clear.

A few remarks may be made with regard to the endorsement of the paper. Under the head of "*station*," the precise location of the command should be entered. This is too often filled up "Camp Wood," "Camp Sackett," etc. The name of the camp alone, however, gives no information, in so vast an army as ours, of the whereabouts of the command. If mentioned, it should have the locality carefully added, as Camp C——, on L—— River, five miles from —— City, Kentucky, or as the case may be.

The name of the division, army corps, and army to which the command belongs, should also be specified. The name of the surgeon forwarding the report should never be omitted, as is too often done.

Under the head of "command," the name of the regiment

in full, with the letters of the companies, if less than a whole regiment, or parts of several regiments, are present, should be carefully inserted.

A word may here be said as to the simplest and easiest method of keeping in the field records from which the sick report may be accurately compiled. The complicated series of books necessary in great hospitals are here out of the question, and the place of register, prescription book, diet book, and case book can be filled by a single memorandum book ruled as in the example given in the following form, which has recently been determined upon by the Surgeon-General for issue to commands in the field. The filling up in the following example sufficiently illustrates the method of keeping this simple record.

REGISTER AND PRESCRIPTION BOOK OF 110TH REGIMENT N. Y. S. V.

Number.	Name.	Rank.	Regiment.	Company.	Disease.	In Hospital or quarters.	Prescription and Remarks.
	January 1st, 1863.						
1	James Barron.....	P.	.....	C	Pneumonia.....	H.	3 aperient pills; opiate at night.
2	Joseph P. Smith....	P.	.....	H	Diarrhœa.....	H.	2 comp. cathartic pills.
3	William Parker.....	P.	.....	K	Int. fever, quotid.....	Q.	5 quinia pills an hour before the time for next paroxysm.
4	Andrew J. Johnson	P.	.....	A	Chr. rheumatism.....	Q.	10 minims f. e. colchic. seed every 2 hours till it operates.
5	Solomon C. Case....	P.	.....	D	Fract. pelvis.....	H.	Rest; opium every hour till pain is relieved.
	January 2d.						
1	J. Barron.....	.....	.....	C	.....	H.	A dose of cough mixture every 3 hours.
2	J. P. Smith.....	.....	.....	H	....	H.	Opium pill after each evacuation.
3	W. Parker.....	.....	.....	K	.....	.....	Duty; repeat the quinia this day a week.
4	A. J. Johnson.....	.....	.....	A	.....	Q.	Frictions with liniment.
5	S. C. Case.....	.....	.....	D	.....	H.	Cont. opium pill every 3 hours.
6	Geo. H. Anderson...	Corp.	110th N.H.	E	Gunshot wd. r. leg....	H.	Amputation below r. knee. (Found wounded.)
7	Peter A. Cummings	P.	98th Conn.	I	Fract. r. thigh.....	H.	Provisional dressing. (Found wounded.)
8	Abraham Concord..	P.	.....	F	Primary syphilis.....	Q.	Lunar caustic to chancres.

REGISTER AND PRESCRIPTION BOOK OF 110TH REGIMENT N. Y. S. V.—*Continued.*

Number.	Name.	Rank.	Regiment.	Company.	Disease.	In Hospital or quarters.	Prescription and Remarks.
	January 3d.						
1	J. Barron	.....	.....	C	.....	.....	General hospital.
2	J. P. Smith	.....	.....	H	.....	.....	Discharged on certif. of ord. disability.
3	A. J. Johnson	.....	.....	A	.....	.....	Duty.
4	S. C. Case	.....	.....	D	.....	.....	Died 4 A.M. Autop. Fract. r. ilium; rupt. of bladder.
5	G. H. Anderson	.....	110th N.H.	E	.....	H.	Dressings.
6	P. A. Cummiugs	.....	98th Conn.	I	.....	.....	Sent to his regiment, 98th Conn.
7	A. Concord	.....	.....	F	.....	Q.	Water-dressing to penis.
8	John Adams	P.	.....	G	Drunkenness	Q.	Confined under guard.
9	Chas. E. Ingraham.	P.	25th Me.	A	Gunshot wd. r. foot	H.	Water-dressing. (Found wounded.)
10	Alexander Hearns.	Serg.	2d Mass.	F	Do. of scalp	H.	Shave parts and apply water-dressing. (Found wounded.)
11	Samuel Singer	P.	20th Conn.	B	Bayonet wd. chest	H.	Rest; firm bandage; 2 opium pills. (Found wounded.)
	January 4th.						
1	G. H. Anderson	.....	110th N.H.	E	.....	H.	Dressings; 2 aperient pills.
2	A. Concord	.....	.....	F	.....	Q.	Wash of sulph. zinc, 10 grs. to fluid ounce.
3	J. Adams	.....	.....	G	.....	.....	Duty.
4	C. E. Ingraham	.....	25th Me.	A	.....	.....	Sent to his regiment.
5	A. Hearns	.....	2d Mass.	F	.....	.....	Sent to his regiment.
6	S. Singer	.....	20th Conn.	B	.....	.....	Sent to his regiment.
7	Jacob Ashley	P.	.....	A	Insanity	H.	Insane asylum.
8	Terence Bly	P.	.....	K	Indigestion	Q.	2 cathartic pills; low diet.
9	Seth H. Adams	P.	.....	I	Catarrh	Q.	Cough mixture every 2 hours till it nauseates.
10	John Sanderson	P.	.....	C	Ing. hernia r.	H.	Rest in a recumbent posture.
11	Michael Bunce	P.	.....	F	Catarrh	Q.	Cough mixture 3 times a day.
12	John J. Simons	Corp.	.....	F	Constipation	Q.	2 cathartic pills; to be repeated at night, if requisite.
	January 5th.						
1	G. H. Anderson	.....	110th N.H.	E	.....	.....	General hospital, with certif. for pension.
2	A. Concord	.....	.....	F	.....	H.	Continue l. diet.
3	T. Bly	.....	.....	K	.....	.....	Duty.
4	S. H. Adams	.....	.....	I	.....	Q.	Cough mixture 3 times a day.
5	J. Sanderson	.....	.....	C	.....	H.	Truss applied.
6	M. Bunce	.....	.....	F	.....	Q.	Continue.
7	J. J. Simons	.....	.....	F	.....	Q.	Duty.
8	Andrew Smith	P.	.....	B	Dysentery	H.	10 grs. calomel, followed in 4 hours by 2 aperient pills.
9	Aaron Carter	P.	.....	F	Cholera morbus	H.	Rest and abstinence.
10	Archer Boulton	P.	.....	A	Chr. rheumatism	Q.	10 minims f. e. colchic. seed every 2 hours till it operates.
11	Samuel C. Haines	P.	.....	G	Chr. rheumatism	Q.	Teaspoonful of tart. soda and potassa twice a day; liniment.
12	George Brower	Corp	.....	G	Strict. urethra	Q.	Bougies applied.
13	William Hanson	P.	.....	A	Cont. fever	H.	2 aperient pills; full diet.

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